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AFTER-THOUGHTS RELATING TO THE ST. LOUIS MEETING OF THE WESTERN GAS ASSOCIATION.

Many good things are said at the sessions of our gas associations that possibly escape notice at the time of first presentation, but furnish ample food for after-thought when the papers and discussions are printed; and with your permission, Mr. Editor, I will call attention to a few points as the proceedings are published.

The worthy President and Secretary made a happy hit in selecting Mr. Somerville's paper as the first to be read. It was a good paper, well written, and created an interest at the opening of the convention that continued without abatement to the end of the session. Mr. Somerville gave facts and figures freely, that he must have known would be used by competitors in the manufacture of sulphate. In this particular what a happy contrast our gas meetings now present to those held ten years ago.

Mr. Somerville says he uses 60 gallons clean water to a ton of coal, and obtains 6-ounce liquor. His coal must give him at least 12 gallons more per ton. That would make 72 gallons. Now, if that is all 6-ounce liquor, ought he not obtain 34 pounds sulphate, instead of 22½ pounds, which he reports as the product of 1 ton of coal? If the loss here suggested actually occurs, and if such loss could be prevented, his net profit in the manufacture of sulphate would be nearly doubled.

The discussion that followed the reading of the paper is deserving of more than a passing thought. The position taken by Mr. Fullager and Mr. Somerville, that you could not strengthen the liquor up to 12 ounces, and still have it effective as a purfier, is, in the opinion of the writer, untenable. Whether the liquor is 6 or 16-ounce, will—comparatively speaking—make no difference. So long as it absorbs free ammonia (which 16-ounce liquor will readily do, if kept at the proper temperature), just so long it will continue to be a purifier. Mr. Somerville will doubtless correct his assertion that free ammonia (in the presence of H_2O) will not absorb SH_2 and CO_2, when he thinks more about it.

Professor Douglas was not disposed to believe that the salts of ammonia could have any virtue as a purifier; and Mr. McMillin was very positive that the salts played no part in the removal of the impurities. It is just possible that both Professor Douglas and Mr. McMillin were, in a measure, wrong, and Mr. Somerville right; though the latter did not pretend to say how it would be possible for the salts to be of value, but asserted that such was the fact. With a low temperature in the scrubber, and with two volumes of free ammonia present to one of sulphuretted hydrogen, ammonium sulphide, $(NH_4)_2 S$, will be formed. Now, if we assume that the water containing this salt is raised to a higher temperature in using it the second time, and as there would be but little free ammonia in the liquor—the sulphuretted hydrogen would be in excess in the gas passing through it; then there would be a breaking up of the salt, evolution of free ammonia, and the formation of ammonium sulphyd ate, NH_4HS, and the ammonia set free would be utilized in absorbing SH_2 and CO_2. Ammonium carbonate would meet with similar disassociation and recombination. That is, $(NH_4)_2 CO_3$, H_2O, would, on change of temperature and condition, evolve water and free ammonia, and the acid carbonate, $NH_4 HCO_3$, would be formed.

Now, while it is possible for the above reactions to occur, and therefore possible that Messrs. Douglas and McMillin were wrong, it is much more probable that the sulphydrate and the acid carbonate are formed in the first

instance; and if such be the fact the salts of ammonia possess no virtue as a purifier.

From the paper read by Mr. Hyde it is shown that, while the Cleveland gas works proprietors use nearly 50 per cent. less water, they obtain about the same quantity of ammonia as is gotten at the Indianapolis plant.

"DELTA."

LEGAL PROCEEDINGS IN RELATION TO THE CONSUMERS GAS COMPANY OF JERSEY CITY, N. J.

In our issue of January 16, 1884, it was noted that ex-Governor Bedle, as counsel for the Jersey City and Peoples Gas Light Companies, of Jersey City, N. J., had applied to Judge Knapp of Supreme Court for a writ of *certiorari* to bring before the review of that tribunal an ordinance passed by the Jersey City Board of Aldermen granting the Consumers Gas Light Company the privilege of tearing up the roadways of the city for the purpose of placing conductors for the supply of gas to the inhabitants and the municipality. The Consumers Company first made application to the aldermanic body at the meeting held on March 27, 1883. The matter dragged along without positive action being taken until date of November 27, when the original ordinances asked for were modified in material manner, and, as amended, were passed, shortly afterwards receiving the Mayor's signature. It was at this juncture that the two existing companies applied for the writ, and the merits of the case were argued before the February term of the Supreme Court, Messrs. Knapp, Magie, and Dixon being the judges. In allowing the writ the court decided:

I. The Board of Aldermen of Jersey City is the proper department of the city government to give consent for the laying of gas pipes in the streets, and to prescribe regulations therefor, under section 17 of the "Gas Light Corporations Act."

II. The power of the Board must be exercised by ordinance, which must be introduced at a stated meeting previous to that at which it is passed, and the ordinance must not be materially changed at the last meeting.

III. Gas companies, having the right to use the streets of a city for their gas pipes, may by *certiorari* challenge the legality of municipal proceedings designed to give similar rights to rival companies, and individuals owning the soil of a street may also question the claim of a gas company to lay its pipes therein.

The court holding that *certiorari* should issue, the next step was to review the ordinance, as passed by the Board of Aldermen, to determine whether due form of law had been adhered to in the passage of the enactment. The opinion was delivered (at the beginning of the June term) by Judge Dixon, his two associates concurring therein. We deem it of sufficient importance to the fraternity at large to reproduce its most salient points. Judge Dixon stated—

This *certiorari* brings up an ordinance passed by the Board of Aldermen of Jersey City, designed to give to the Consumers Gas Company the consent to lay gas conductors through the streets of the city, which the 17th section of the Gas Light Corporations Act requires. This ordinance cannot be supported.

The section mentioned empowers corporations formed under that act to lay conductors for coducting gas through the streets of the city, "having first obtained the written consent of the municipal authorities of said city, and under such regulations as they may prescribe." In the government of Jersey City the Board of Aldermen is the proper department to give this consent and prescribe these regulations, for to that Board is delegated the power to pass, alter, or repeal ordinances for regulating or preventing the use of streets for any other purposes than public travel. But, as the section just referred to directs, this power must be exercised by ordinance, and therefore in accordance with the 23d section of the city charter, which provides that no ordinance or bye-law shall be enacted by the Aldermen, unless the same shall have been introduced before the Aldermen at a previous stated meeting. This provision requires that the ordinance as passed shall be substantially the same as it was when before the board at a previous stated meeting, and invalidates it, if materially changed at the meeting in which it was enacted.

The ordinance now before us consists of five sections. Four of these sections composed the ordinance as introduced March 27, 1883. At the meeting of November 27, 1883, the 4th section was amended, the 5th section was added, and the whole was then adopted. The changes made were material; and, therefore, the ordinance could not be legally passed at that meeting.

The prosecutors have a right to challenge the legality of the ordinance. They are two gas companies now supplying the city with gas, through their pipes lawfully laid in the streets, and are two residents of the city owning land upon its streets. The ordinance in question authorizes the tearing up of every street in the city, to enable the defendant to lay the pipes necessary for carrying on a business in competition with the prosecuting companies. Thus it appears that beside the common interest which every citizen has in preserving the streets for public travel, these two corporations have special business privileges which they are entitled to protect against any unlawful rivalry, and these individual prosecutors have estates in the soil of the streets, from which they have a right to avert threatened trespass.

The ordinance must be set aside.

In the early part of May last the Consumers Company again appeared in the role of a petitioner before the Jersey City Board of Aldermen. A new ordinance was drafted, and presented to the council; the measure receiving affirmative sanction on May 13. Mayor Collins on May 24 vetoed the ordinance, giving, among others, the following reasons in explanation of his action:

"It will be time enough to consider the wisdom of granting unconditional consent to this company to lay its pipes when the Court shall have decided that the consent already granted upon a condition, entirely satisfactory to the company, and advantageous to the city, is ineffectual. Moreover, should the Court, for any reason, declare the former ordinance invalid, it is surely possible to frame a new one which will avoid the objection the Court may point out, and, at the same time, secure to the city the advantage the company professes to be willing to give. It has been urged before me in support of the ordinance that the scheme of the act under which the company is incorporated is such that the consent of the city authorities is required by law to be given under proper regulations, and that we have no right to refuse consent to the laying of gas pipes by any company which asks the privilege, but only to prescribe reasonable regulations. I think that question should be considered in the light of the anticipated decision of the Supreme Court when rendered. In the absence of judicial authority I find myself unable to so construe the act. I think we should feel chagrined, and not only so, but that we would be proper objects for censure, if we were to now grant the unlimited consent asked by this ordinance, and next Thursday week (June 5) by the decision of the Supreme Court, the former ordinance should be sustained, and it should be found that we had needlessly thrown away a valuable right of the city; on the other hand, should the former ordinance be overthrown, the whole subject will be before us, and no harm will have been done to anyone, so far as I can see."

At the meeting of the Board of Aldermen, held Tuesday, June 10, the message was considered, with the final result that the ordinance was passed over the veto. Here we have an excellent example of how municipal bodies protect the interests committed to their care, and a further illustration of the ease and facility with which these liberal minded conservitors grant speculators the right to invade the streets of cities and towns to the injury of already existing vested interests. It is a matter of fact that the Jersey City and Peoples Gas Light Companies are more than able to meet the requirements of the gas consumers of their city, and the addition of another plant is simply placing the gas consumer in a position where he will, in the future, be obliged to pay most dearly for the shortsightedness of the representatives placed in office through the instrumentality of his vote.

French Patent Fuel.

A very simple process for manufacturing patented fuel is being at present employed in France, which enables the working up into a merchantable article of vast quantities of coal-dust. The coal-dust is mixed with coal-tar pitch and poured into cups attached to a belt, each cup containing enough material for a brick of the size desired. The belt in its movement passes this material through a chamber where it is exposed to hot steam, which fuses the two substances into a homogeneous mass. This is poured, by the descent of the belt, into molds, where it is subjected to an enormous pressure by a hydraulic press, or by machinery set in motion by a steam-engine.

The brick is square in form, its thickness being about one-third of its other dimensions, and as manufactured in Nantes, weighs five, ten, or nfteen pounds. The railway companies refuse to accept fuel unless at least 10 per cent. of pitch has been used for its agglomeration. Fuel manufactured with a smaller per cent. of pitch is, of course, of inferior quality.

It is stated that for a number of years the Orleans Railway Company bought annually, by contract, from 45,000 to 60,000 tons of "briquettes" at the rate of $5 per ton.

The following estimate of the cost of manufacture is given by one extensively engaged in the business:

Coal per ton, in Wales	$1.00	to	$1.25
Freight on same	1.60	"	1.60
Duties on same	26	"	26
Handling, sifting, etc	56	"	56
Tenth of a ton of pitch	1.00	"	1.20
	$4.42	to	$4.87

The dust purchased directly from the local merchants costs $2.80 a ton, delivered at the works. The pitch costs from $10 to $12 per ton. Considerable quantities of coal-dust are imported on account of native French supply being inadequate to satisfy the demands of the French patent fuel manufacturers.

[Official Report.—Continued from page 267.]

Seventh Annual Meeting of the Western Gas Association.

Held at the Southern Hotel, St. Louis, Mo., May 14, 15, and 16, 1884.

First Day—Morning Session—May 14.

DISCUSSION ON PAPERS PUBLISHED IN ISSUE OF JUNE 2.

When Mr. Hyde had finished the reading of his paper on "Ammonia Washer-Scrubbers," Chairman Lansden said that discussion could take place, in accordance with the idea proposed by Mr. Hyde, so as to include any further remarks that members might like to make regarding the paper of Mr. Somerville on "The Manufacture of Sulphate of Ammonia." The Chairman also renewed the hope that every one interested in either or both of the topics treated by the authors would be heard from.

Mr. Thomas—Mr. Hyde states that he used brush in his scrubbers. The employment of coke or brush in scrubbers has, I believe, been almost entirely abandoned in our Eastern gas works, experience going to prove that the most efficient work is done when using wooden trays alone. These trays are about 4 or 4½ inches in depth, the slats being ¼ or ⅜-inch in thickness, and about the same distance apart. The tiers of trays are separated, from bottom of one to top of the other, by about 9 inches of space, each set being placed at right angles with the one below it. This disposition of the trays allows the gas, in its passage through the scrubber, to be more thoroughly broken up, and brought more immediately in contact with the wetted surface of the trays. One great disadvantage attaching to the tower scrubber, as it appears to me, is that, in order to do its work efficiently, it requires to be worked to its maximum capacity. If the vessel be made to pass 500,000 cubic feet per day, then the quantity passed should closely approximate to those figures. On the other hand, my experience with the "Standard" scrubber has been that it makes slight difference whether you are making 100,000 or 500,000 cubic feet, if the machine be capable of passing the larger quantity; and the work will be as thoroughly done with one quantity as the other. In my first use of the "Standard" scrubbers the gas was taken directly from the hydraulic main by the exhausters, then going into the scrubbers; under this mode of working the temperature of the gas, at inlet of scrubbers, ranged from 110° to 115° F., passage through the vessel reducing the temperature by 10° to 12° F. Some four or five months trial of this plan caused me no trouble; still I concluded that by experimenting in another direction I should be enabled to manufacture a stronger liquor. Accordingly I tried the plan of first passing the gas through the condensers, and then running it through the scrubbers, with the result that the temperature at inlet was reduced to about an average of 82° F.

In adopting and using the "Standard" scrubbers I got at the time what I believe was the highest price then paid for ammoniacal liquor in this country. I formerly received, from parties taking the liquor, 7 cents per ton of coal carbonized; but after putting the "Standard" scrubber in use I contracted for the sale of the liquor at the rate of 27½ cents—an increase of 20½ cents per ton of coal carbonized. From knowledge since gained, I am of the opinion that still better profit could be obtained by manufacturing the liquor into sulphate.

In the first use of the scrubbers I paid close attention to experiments as to the quantity of water needed to give the best results, and after repeated trials finally determined on 1.2 gallons of water per 1,000 cubic feet of gas manufactured as the proper proportion, keeping as near as possible to that ratio. The liquor in the scrubbers would average in strength from 14 to 16 ounces; that from the scrubbers, condensers, and hydraulic main (all collected together) would average 10½ ounces; and the average quantity of liquor per ton of coal carbonized was 30 gallons.

A slight financial comparison showed that the company received within a few cents of $4,200 more per annum for the liquor, when working with the "Standard" scrubber, than when going on under the old system. The bills for water supply were also considerably reduced, through the fact that water was used only in the scrubbers, and not in the washer, as had formerly been done. An analysis of the gas was made by one of our prominent chemists of New York city, and the expert pronounced it as pure and free from objectionable constituents as any other gas manufactured in the United States; and, in my opinion, I am free to say this state of affairs was due largely to the use of the "Standard" scrubbers.

Mr. King—I should like to hear from our Vice-President; I believe he has a "Standard" scrubber, and also operates an ammonia works.

The Vice-President—I do not propose to take any active part in the discussion just now; nor is it necessary for me to do so, as Mr. Thomas has spoken in a strain similar to that of my experience, although I might add that my company gets 28¾ cents, per ton of coal carbonized for the liquor, where it only got 10 cents before. I find a benefit in the way of purification, but cannot tell exactly how great that benefit is. My friend Slater, from Providence, has used the "Standard" longer than I have, and I should like to hear from him in regard thereto.

Mr. Slater—I can confirm what Mr. Thomas has said, his results and experience in the matter being quite similar to my own. I did have one little troublesome occurrence, but that was easily explained. We had been supplying water to the scrubbers, which was pumped from an artesian well about 400 feet in depth. The well water contained more or less limey substances, and the result was a scale formed between the plates of the vessels. After abandoning the use of the well-water, and drawing our supply from the city's mains, the scale deposits ceased.

The Vice-President—I did not intend to say anything more upon this subject, but I must relate that the same trouble occurred to me in my working as happened to Mr. Slater. After six or eight weeks of using a well-water (subsequent tests showing the water to be strongly impregnated with lime) the scrubbers stopped up. I took the vessel apart, displaced the discs of two sections, and removed a large quantity of scale. Using the water supplied from the city water works proved a complete cure.

Mr. Thomas—It is worthy of note, that when trying to get a good price for our ammoniacal liquor, a great deal of persistent hard work had to be indulged in. The contractors who were taking it claimed that they could not afford to pay over 15 cents per ton of coal carbonized for the greatly increased strength of liquor we expected to make through the agency of the "Standard" scrubber. After listening to these arguments I came to the conclusion that if we could not get a better figure than 15 cents it would be much wiser to work the liquor up ourselves. At the time of which I speak it was almost impossible to obtain authentic information in this country relative to the cost of an ammonia plant, and I accordingly wrote to England for the desired particulars. The supposition then was that an ammonia plant capable of working up the product from the carbonization of 30,000 tons of coal per annum would cost in the neighborhood of $30,000. I think to-day a plant of that capacity could be erected in New York city at a cost not to exceed $5,000. In works carbonizing a much less quantity of coal than that given above a smaller ammonia plant, with sufficiently ample storage tanks for the liquor, would be profitable, inasmuch as the process of sulphate manufacture could be carried on intermittently instead of continuously. If we could approach our trans-Atlantic friends in the matter of the price they get for sulphate, the liquor ought to yield us 50 or 60 cents (instead of 27 or 28 cents) per ton of coal, provided we resorted to the practice of working up the residual ourselves. It seems to me this is well worth thinking over carefully.

Mr. Slater—In regard to our receipts from the sales of ammoniacal liquor, I would state that, previous to putting in the "Standard" scrubbers, we received about $2,000 per year. Since then—we have used the "Standard" during the last year—we have received between $5,000 and $6,000 for the liquor, owing to the increased degree of contained strength.

[The discussion on the subjects mentioned in the two papers was continued at great length, and much diversity of opinion was shown; but there was unanimity concerning the fact that intelligent treatment of the question of the handling and disposal of residual products was of vital importance to the American gas maker. Among those who took prominent part in the discussion were Messrs. Fullager, McMillin, Smedberg, Scofield, Starr, Gimper, Coverdale and Moran.]

When the discussion terminated, Mr. Burtis moved that the thanks of the Association be tendered to Messrs. Somerville and Hyde for the papers presented by them. The motion was carried.

The Vice-President then announced that the following named gentlemen had been appointed to serve as a committee on nomination of officers for ensuing year: Messrs. Thomas Smith, J. W. Butman, and James Montgomery. As a committee on selection of locality for holding next meeting, Messrs. G. A. Hyde, John Gimper and T. A. Bates. At this point the Association took a recess, voting to recommence business at 2 o'clock P. M.

First Day—Afternoon Session.

The Association was called to order at 2 o'clock P.M., Vice-President Lansden in the chair, and the proceedings were begun with the reading of the following paper, by Mr. George B. Burns, of Bloomington, Illinois, on

GAS FITTING.

Gentlemen:—In presenting to you this paper on "Gas Fitting" there may be nothing new that I can give you beyond what you are already conversant with; but if it shall be the means of bringing out the views of some of the members, and giving us the benefit of their experience in such work, I shall be highly gratified.

In a little volume which I have at home, called the "Gas Fitter and Plumber's Guide," published by J. D. Galloway, Philadelphia, Pa., I find a great many good things—yet, through my experience, I cannot entirely agree with him in all that he says; still, if all gas fitting was done as he has recommended in his volume, it would save the average "gas man" a great deal

of annoyance and trouble arising from imperfect jobs of work. I will give a few words of his in relation to gas-fitting in its earliest days.

"The business of gas-fitting had its origin in this country nearly forty years ago" (his book was published in 1875), "and at that time, and for years afterwards, it was a slow, expensive, and laborious job to pipe a house properly. It was a common, if not a universal, practice at that time for gas-fitters to manufacture their own fixtures, fittings, etc. The original fittings were forged from wrought iron, and were as clumsy as they were expensive affairs. All, or nearly all, of the original work of that time has been removed and replaced by piping of more modern construction, and it is now a subject of much wonder and speculation, when, at long intervals, the march of improvement causes the removal of some old city land mark or dilapidated dwelling, with its ancient gas pipe, and quaint, massive, old joints of iron or brass, which have long since been replaced by neat, light malleable iron, of more graceful and economical proportions."

In my own experience I have met with quite a number of the old brass fittings; but, as yet, I have not met with the wrought iron ones mentioned by Mr. Galloway, other than the ordinary couplings that come on the pipe.

He goes on further to say:

"On account of the expense involved, but few fittings were used, the pipes being bent in the forms desired for elbows and offsetts; for T pieces, short nipples were dovetailed into the part of the main requiring an outlet, and then soldered fast. Light brass fittings then came into use, and bends became a thing of the past; and now, with the cheap fittings of the present day, bends, where they can be avoided, are an absurdity, and belong to the 'penny wise and pound foolish class.'"

I do not agree with our friend right here as to the bends; but I will come to that again, further on.

In piping buildings it has been customary, in most Western cities, to use a scale or table of piping that is published in a great many of the gas engineers' and superintendents' pocket almanacs, and is, I believe, commonly known as the "Philadelphia Scale." It is as follows:

Size of Tubing.	Greatest Length Allowed.	Greatest Number of Burners.
¼ inch	6 feet	1
⅜ "	20 "	3
½ "	30 "	6
⅝ "	40 "	12
¾ "	50 "	20
1 "	70 "	35
1¼ "	100 "	60
1½ "	150 "	100
2 "	200 "	200

I would prefer to change the above somewhat, and I believe you will all agree with me in so doing. I would like to make it read something like this:

Size of Pipe.	Greatest Length Allowed.	Greatest Number of Outlets Allowed ⅜ Openings.	Greatest Number of Burners Allowed.
⅜ inch	20 feet	3	6
½ "	30 "	6	12
¾ "	40 "	12	24
1 "	50 "	20	40
1¼ "	70 "	40	80
1½ "	100 "	70	140
2 "	150 "	100	200

As you will see, the change leaves out entirely ¼ and ⅝-inch pipes. One-quarter inch is too small, and there is no ⅝-inch wrought iron pipe offered to the trade or made that I know of. My impression is that the ⅝-inch pipe is mentioned because there was a time when lead and composition pipes of that size were used for gas, even in this country. I spent one winter a number of years ago in New Orleans, La., and I met with a great deal of composition pipe there while I was working at gas fitting—the joints and branches having been made by soldering with a torch and blow pipe, using a little rosin and a small strip of solder after preparing the joints. The use of ¼-inch pipe in all concealed work should in every case be prohibited, and gas-fitters should be compelled, in some way or another, to always run their pipes large. You all know what an annoyance it is at times to have a consumer blame you because he cannot get a supply of gas sufficient for all purposes in his place of business or dwelling, as the case may be, simply because the gas-fitter who piped the building did it for so much per foot, running measure; and, to make the most profit on the job, run all the small pipe he could get in, knowing that the consumer could be none the wiser for it, and when he was paid for his work that ended it as far as he was concerned, thus leaving the consumer to fix it as best he could, or have the fitter sent for again to overhaul the pipes and see where the stoppage was.

In the putting in of pipes and the screwing on of fittings too much care cannot be taken, as it has now, I believe, become the common practice to use a mixture of red or white lead and boiled linseed oil for each joint. For myself, I prefer to use gas-fitter's cement in the shop for putting on the fittings, and then use the lead on the threads of the pieces as they are screwed together in the building. I claim that by heating the end of the pipe and the fitting at the shop, when the pipe is being gotten out, and cementing them well and screwing them together solid, when they cool they are tighter than they can possibly be when screwed together cold. I also believe the fitting expands more with the heat than the pipe does, and when cooling it shrinks on to the pipe, making the fitting so tight that the ordinary hammering and pounding in a new building would have no effect on it—at least no more than on one put on with lead, if as much. A small Bunsen burner (like the "Comet") will heat fittings as fast as they can be cemented and screwed on by the fitter.

My greatest objection to using all lead is that fitters and their helpers use too much of it on the inside of fittings. The lead is forced inside beyond the end of the pipe, and often, when dry, almost closing it, and sometimes entirely shutting off the flow of gas through the pipe. I remember, about 12 or 13 years ago, I took out a lot of pipe from a house in this city (St. Louis, Mo.), located on Garrison avenue. In that house, for bracket risers, there were ½-inch pipes, with ⅜ x ½-inch elbows for the nipples which came through the wall, giving a ⅜-inch outlet on which to screw the bracket. I also found ⅜-inch couplings or sockets that were so stopped up with the lead that you could not run a pin through the opening. Fitters should always be required to run either ⅜ or ½-inch pipe for brackets, and where the outlet comes through the wall or plaster, to use either a bend or a long drop elbow; the bend is to be preferred, because it can be made the right length to come through and leave room for the bracket back and bracket outside of the plaster. Still, in a great many cases the long drop elbows will answer where they are of sufficient length to come through the lath and plaster; but most of them, as made now, are a trifle too short, and have to be brought out with an extension piece, which is an objection to their employment.

Never allow a fitter to use, when such use can possibly be avoided, a nipple coming through the wall, as these are liable to unscrew out of the elbow or fitting when taking off a bracket. Drops for chandeliers should also always be a bend, with the main supply pipe alongside of, but not over, where you wish the drop to come. A drop put in with a bend can never be unscrewed out of the ceiling when a chandelier is being removed from it. Of course, all drops and bracket outlets should be firmly fastened in the walls and between the joists. The drops should also be well supported, so as to hold the weight of any chandelier that may be hung upon them, and, further, be adjusted perfectly plumb.

I also believe it best for all gas companies, in no matter how small a town, to have a competent inspector to pass upon every job of gas fitting done. The inspector should be required to carefully examine the runs of pipe in order to determine that the scale has not been overrun, and note that the work is tested with a proving pump and gauge, and that the pipes are free from end to end. This latter can be done by having a man at the pump and requiring the fitter to go with the inspector to all parts of the building, and to take off any cap desired, allowing the pressure to "blow" at the outlet so uncapped, not forgetting the large cap at the end of the large riser where the outlet from the meter will be attached. Piping should always be proved with a reasonably good pressure. My own experience would favor a column of mercury not less than 5 inches shown in the glass tube, or 10 pounds shown by a low-pressure steam gauge. I prefer the steam gauge, as then you are not bothered by any loss of mercury, and the gas-fitter cannot have a conspirator placed in a hidden spot with an alcohol torch heating the pipe, so as to keep the pressure up in case of a small leak, as has so often been done with the mercury gauge.

It should also be the duty of the inspector to carefully go over all the pipes, in order to prove that the fitter had left no "traps." Only during this last fall, at Bloomington, Ill., in passing through the new Turner Hall, I noticed that the fitter had made two very bad traps, which, if allowed to remain, would have shut off the light for the newel posts in the main entrance. A 12-inch timber happening to be in his way, instead of going through it, or over it, which could easily have been done, as he was using only ⅜-inch pipe, he dropped down and went under it, coming up on the other side, leaving about three feet of pipe at each place to fill up, and making about as complete U-shaped traps as could be devised. Of course we had this arrangement changed.

In piping buildings where the pipes are all exposed, fittings can be used for all connections and drop-tees and elbows for the outlets for the fixtures. Extra outlets fitted with plugs should be placed at convenient points, so that when extensions are necessary they can be made with less labor and trouble than where no outlets are left. One-quarter inch pipe should also be prohibited, except for short extensions, or in places where a larger pipe would look too badly or take up too much room—notably in offices, or for desks in business houses. In most cases, however, ⅜-inch pipe will be found to answer, and insure a better flow of gas to the burners.

Discussion.

When the Chairman had invited discussion on the paper read by Mr. Burns, Prof. Douglas said that while visiting London, England, in the summer of last year, he observed, in the house where he had his apartments, that the gas piping was out in full view, no attempt being made at concealing it. On inquiring as to the reason for this system he was told that the law required such a course to be followed. He thought it was a curious practice, and doubted whether it was of any benefit.

The Vice-President remarked that he thought a similar practice prevailed in France, more particularly in Paris.

Mr. Watts did not agree with Mr. Burns as to cement, claiming that difference in temperature was an objection to its use, it being likely to become quite brittle in cold weather. Mr. Watts preferred a mixture of white and red led, or red lead alone.

Mr. Judge agreed entirely with Mr. Burns as to good results obtained in the use of bends.

Mr. King thought gas companies should make it a general custom to oblige gas-fitters and plumbers to file plans of the piping done by them in houses.

Mr. Fullager stated that this practice had always been carried out strictly to the letter by the Cincinnati (Ohio) Gas Company.

The Chairman, after a vote of thanks had been tendered to Mr. Burns, announced that Mr. James R. Smedberg, of Lancaster, Pa., was ready to submit a paper on

THE PELOUZE AND AUDOUIN CONDENSER.

Preparatory to reading the paper proper, the author submitted several circular letters received at various times from gas engineers throughout the country as to the efficacy of the Pelouze and Audouin condenser, and then proceeded as follows:

Many physicists hold that fogs such as San Francisco and (yet more) London are familiar with are composed of extremely minute and homogeneous droplets of water, which are sustained in the atmosphere by vertical currents of heated air, just as any fine powder is borne forward by the wind.

The distinguished Tyndall concurs in this view, defining water vapor as something invisible, ceasing to be vapor as it changes to "water dust," or cloud. He applies indifferently the terms "vaporous" or "gaseous" to that invisible form of water of which a very dry natural air carries one-half per cent., while he calls "water dust" that visible fog-like form which is usually styled "vapor." It is well to remember that our "vapor" and Tyndall's "water dust" are identical.

His noble volume on "Heat as a Mode of Motion" will remind you that the old doctrine of a material caloric has passed away forever. The molecules of every solid body are now believed to be in restless vibratory motion, though its mass be quiescent; while the molecules of a liquid have a double motion, each one vibrating as in a solid, but having also a rotary motion about its own axis. Finally, in aeriform substances, the particles not only revolve, but penetrate in right lines through space, instead of having the reciprocating motion of those of the solid and of the liquid. "What in our sensation is *heat*, in the object is nothing but *motion*," increasing in degree as its sensation increases, and varying in kind between the three great natural classes of matter.

To explain the suspension of clouds in the atmosphere Halley first proposed the hypothesis of vesicular vapors—that clouds, namely, are formed of an infinity of extremely small vesicles, hollow like soap bubbles, and filled with air hotter than the surrounding air, so that they float or ascend like so many little Montgolfier balloons. This theory has been favored by Saussure, Kratzenstein, Bravais, and most distinguished meteorologists.

All scientific men are fortunately in accord on the vital point that the powerful repulsion existing between these particles, whether due to centrifugal velocity, to electricity, or to both combined—is the cause which mainly preserves them in individual form. The various modes of overcoming this repulsion—of aggravating the molecules, of reliquefying the vapor—are cooling, chemical affinity, compression, and finally percussion.

Of these, cooling is the most usual and obvious—so obvious that, to many, cooling and condensation are synonyms; and this notwithstanding that the condensing effect of a lowered temperature depends upon the character of the generating liquids, and is but imperfect in the cases of the vapors of them all within the ordinary thermal range.

The condensing work of chemical affinity is a laboratory question, and, therefore, outside of our present inquiry.

By compression, a saturated vapor is reducible to a liquid, which regains the vapor form as the pressure is released. Thus, carbonic acid gas liquefies under pressure; and when the liquid is re-opened to the atmosphere a portion of it at once regains the gaseous form, while the remainder is converted, by intense evaporation, into a white, flaky solid, of a temperature of nearly 170° F. below the zero of that scale. But compression acts imperfectly, because it acts both upon the liquid molecules and the gaseous interspaces, and therefore cannot completely induce such violent agitation as shall at once lessen the repulsive motion and increase that cohesive attraction which is more powerful between liquid and liquid than between liquid and gas.

By long friction against solid surfaces, the centrifugal velocity of the molecules is destroyed, and the superiority of cohesive force established; but this agent is at best tedious and uncertain, as each molecule in turn must be brought into positive contact with the surfaces before the purpose of these last can be fulfilled.

We have thus briefly noticed the main points necessary to a comprehension of the invention of Messrs. Pelouze and Audouin. These gentlemen, like others, noticed that the tarry vapors of coal gas are so intimately entangled with their vehicle that mere cooling cannot separate them; and believed, with Halley, that the tarry particles are present in the gas in the form of vesicles. Whether vesicles or not, there they certainly are, in most minute subdivision, constituting an obstinate nuisance to the gas maker from facts important and numerous enough to warrant a separate essay.

Even long circuit over transmitting or frictional surfaces, and forcible scrubbing, fail to completely arrest the tar, which, at nearly all of our nine hundred gas works, passes on in such quantities as to embarrass the action of hydrate of lime, and of iron oxide, on sulphuretted hydrogen. As liquefaction must accompany the establishment of perfect contact of the tarry molecules with each other, or with a wet surface, our inventors sought to construct an instrument which (applying the principle of condensation by *percussion*), independently of temperature, should enforce such contact at smaller expense of power, and should be of compact form. They therefore broke the whole gas-flow up into an equivalent number of very small jets, and caused these jets to play against a blank surface. As a matter of security this impact was repeated; and in the delivery and adjustment of these blows consists the next to magical efficiency of the Pelouze and Audouin condenser.

My own share in the development of the machine itself has been the reversal of flow and arrangement of counterbalance, the device of the differential gauge, with its unequal calibration and triple purpose, and the mounting of the cylindrical condenser case on a stationary bye-pass box, upon which the former may be revolved through an arc of 180°. The exact relation of the chamberings of case and box you will understand from the model and drawing before you; and I need only say that the condenser is in effect the cover of a rotary valve, and may be thrown into or out of work by simply giving it a half revolution. What an advantage this gives in a crowded station you will understand when I mention that a machine to pass 1,500,000 cubic feet per day, comprising its own bye-pass, occupies a floor space only 3 ft. 6 in. square.

The outer case of the apparatus first erected for the Paris (France) Gas Company was only 4 feet square, although the machine was of ample size to treat the large volume of 2,500 cubic feet per minute.

The preliminary or experimental apparatus was in glass, so that its action could clearly be seen; and the useful effect of percussion (or impact) was proved by ocular demonstration of the following important fact:

When the gas was flowing in a calm current, and under very low pressure, through the orifices, the jets issuing from the final plates presented the usual brown and murky appearance of the tar vapors, and but little liquid was surrendered to the lower part of the enclosing vessel, showing that compression alone was but a feeble condensing agent. But when a vacuum was established at the outlet of the apparatus, so as to invest the jets with a considerable velocity, the glass case was instantly emptied of its cloud; the final jets were found to have become invisible, and the liquids were surrendered in very largely increased volume.

But there is another phenomenon attending the action of the instrument, which also appeals to our sense of vision; I refer to a sort of sparkling dash and activity in the motion of the liquids as they escape the fetters which have previously entangled them. Emile Durand, of one of the Paris gas journals, says, with Gallic enthusiasm, that "it is really a pleasure to behold" this, and his transport is hardly to be laughed at; for this sparkle is forcibly suggestive of explosion, and therefore of the vesicular form of the liquid molecules. In fact, it is hardly too much to say that it proves Halley's hypothesis to be true.

If you blow a soap bubble full of tobacco smoke, and remove your mouth from the stem of the pipe while the bubble remains attached to the bowl, the bubble will gradually discharge its contents in a steady flow of smoke from the stem, until the viscid envelope has gradually shrunk to a flat disc across the mouth of the bowl.

If you shake off a completed bubble upon a table-cloth in a quiet room, you have a beautiful milk-white sphere with the prismatic colors playing over its surface. Presently, however, as you watch it closely, the bubble bursts; you see the self-same sparkle of the liquid, and the smoke assumes the symmetrical form of a horizontal ring, of a diameter two or three times that of the spherical envelope from which it has escaped.

The smoke, when enclosed in the larger vesicle, is under tension due to the cohesive attraction of the viscid envelope, which finally explodes with vigor, just as the smaller vesicle does; and we can hardly, therefore, avoid the conclusion that the structure of each is the same.

The "differential gauge" was logically suggested by the action of the condensing drum itself, which last depends for its effect, not upon any *absolute* pressure, but upon the *difference* of the pressure acting upon the exterior and interior respectively of the crown of the drum. The outlet pressure forces it down, and the inlet pressure forces it up; the difference, or working pressure, is established at any desired figure by the amount of counterpoise, and in its turn establishes the velocity and work of the jets. Hence the drum works equally well whether upon the vacuum side or the pressure side of the exhauster, whatever be the volume. One fact is not without general interest—that the pressure necessary to liberate all the entangled coal tar from coal gas is measured by a column of water of about 8-10ths of an inch high. Or, to use language more intelligible to most of our professional brothers, that pressure is only 1-35th of a pound to the square inch.

Returning, now, from this digression to the differential gauge, I would observe that the two glass legs are connected at bottom by a duct which permits the transfer of the indicating liquid from one leg to the other, according to the pressure admitted to the gauge. Hence the two columns of liquid are in statical equilibrium with the condensing drum, and the difference of their heights is the measure of the pressure upon the jets.

We will often require to know the absolute pressure or vacuum existing at the inlet or at the outlet of the condenser, and the gauge is therefore supplied with two release cocks, C and D, connecting the head of each tube with the atmosphere. The larger cocks, A and B, of course act to open or close the two pipes which communicate with the condenser. These four cocks, then, give us the power of the following combinations, viz.:

1st. To ascertain the absolute inlet pressure, we open A and B only.

2d. To ascertain the absolute outlet pressure, we open D and C only.

3d. To ascertain the differential pressure, or, in other words, the working pressure of the condenser, we open A and B only.

The gauge, then records, 1st, absolute, and, 2d, differential pressure; but it also possesses a third feature equally novel with its power of combination. This last feature consists of making the transfer duct at bottom very much smaller than that of the tubes themselves, the diameter of the former being only 1-10th that of the latter.

We thus, by slowing down the velocity of transfer, reduce the height of the oscillations in the tubes to one one-hundreth of what it is in a gauge constructed with uniform calibres. These oscillations, it is interesting to observe, while mainly effected by the intermittent pulsation of most forms of the exhauster, are partly due to that "rhythmic beat," in which all vapors are generated, made visible by Tyndall in the rosette-shaped cushion of vapor which supports water in the spheroidal state.

Let me now make a few statements in regard to the characteristics of this condenser.

1st. It works as well without as with an exhauster.

2d. It works as well if placed on the inlet as on the outlet of the exhauster; but where a steam-jet exhauster is used, the Pelouze and Audouin condenser should precede it.

3d. Its action involves no water supply, and no motive power.

4th. Where clay retorts are used (as they never should be) without an exhauster, the condenser will increase the back pressure on the retorts by a figure of from six-tenths to ten-tenths. I may as well say, however, that there are few small works in which the dip-pipe seal cannot be lessened, or wetter lime employed, so as to take off as much back pressure as the condenser puts on.

5th. It is absolutely automatic for all volumes passing, from zero up to its rated capacity.

6th. It perfectly separates the tar at a temperature of 130° F.; but at this temperature refuses the vapors of the coal naphthas, and of water.

7th. It should be placed next the hydraulic main, and the nearer that vessel the better.

8th. The floor space occupied by it in no case exceeds a square whose side is three times the diameter of the connections. Thus the bottom box of a 6-inch machine is 18 inches square.

9th. The machine will run without cleaning for a period, varying with the coals used and the gas-temperature, of from one to three years.

10th. It permits the use of a coke-scrubber, which is the simplest and cheapest form of that instrument. Where coke can be kept free from blocking up with tar, until the gas-ways become small and sinuous tubes, there coke is every way preferable for the scrubber-load, on account of its rough surfaces and sponge-like power of holding water.

11th. Its counterbalance once set, the condenser requires no attention or manipulation whatever, except at times of cleaning.

12th. It its practically imperishable in every part.

13th. Where treating very hot gas, it should add, by a small amount, to the candle power of the completed gas.

14th. Where treating cold gas, the candle power will remain unchanged; and the gas will be so dried that water lubrication will be needed in the rotary exhauster, if that instrument follows the Pelouze and Audouin condenser in the train of apparatus.

15th. Where treating gas from coal, it neither increases nor diminishes naphthaline. When treating water gas (at any rate in the Tessié du Motay process) it separates naphthaline, and deposits it so very rapidly on the plates of impact as to necessitate a cleansing flow of steam, but reduces the amount of undecomposed naphtha vapors almost to nothing, thus adding to the lifetime of the consumers' meters.

16th. It adds to the cleanliness of the ammoniacal liquor from the multitubulars and scrubbers, and thus aids the manufacture of ammonia.

17th. It diminishes the chance of stoppages.

18th. It reduces the amount of soot carried forward.

19th. It effects a slight saving in lime; and makes it more important than ever that the hydrate should be worked as wet as possible.

20th. Where iron sponge, or any other form of iron oxide is used, it just about doubles the life-time of the material; thus reducing the cost of iron purification nearly one-half.

21st. Not a rivet is used about the new-model drums, which can readily be taken apart and readjusted by any competent tinner.

22d. Where a multitubular or atmospheric condenser follows the Pelouze and Audouin condenser, the former need not be so large, and it will require less water for equal volumes; because the entangled liquids with their *high* specific heats have been largely removed; and only the gaseous vehicle, with its *low* specific heat, remains.

23d. It greatly facilitates the separation of ammonia by sawdust and sulphuric acid.

24th. It is very pertinently suggested that where regenerative furnaces are used, these condensers should be so mounted on the gas outlets as to return the tar to the hydraulic main, and thus keep that vessel washed clean of pitch.

25th. And now, gentlemen, you have on the table photographs, drawing, model, test papers, and are as well qualified to pass judgment on the Pelouze and Audouin condenser as though you had, like myself, been perspiring over it for 10 years.

Discussion.

Vice-President Lansden called Mr. James Somerville to the Chair, and the Chairman *pro tem.* stated that Mr. Smedberg would be perfectly willing to answer any questions that might be put to him.

Prof. Douglas said he had been greatly interested in the paper read by Mr. Smedberg. There was one point upon which he would like to have the author's views, and that was this: They all knew it was very important to retain the gas as long as possible in contact with the tar, and he (Prof. Douglas) would ask Mr. Smedberg to what extent, if any, the use of the Pelouze instrument would detract from the illuminating power of the gas. Such a result might not occur at all; still, as the idea had occurred to him, he thought it better to have the question settled.

Mr. Smedberg said he thought he had anticipated that question in two of the statements contained in the paper. He could answer Prof. Douglas that no bad effect was exerted on the candle power.

Prof. Douglas further stated that he had made many inquiries in regard to the working of the Pelouze and Audouin condenser, and, from the replies he received, he confessed he found it very generally indorsed.

Mr. Smedberg deprecated any extended discussion upon a matter in which he had so large a personal interest. Those of his brother members who wished to make a critical examination into the merits of the instrument could easily obtain all necessary particulars by corresponding with any of the different gas engineers throughout the country who had installed the apparatus in their works.

Chairman Somerville then announced that the next business in order would be the reading of a paper, by Mr. James G. Miller, of Green Bay, Wisconsin, on

WOODEN PIPES FOR GAS MAINS.

Mr. President and Gentlemen:—In preparing this paper my purpose was simply to give the Association whatever benefit might arise from a recital of the experience gained by me while using wooden pipes for gas mains, with the possibility of showing the advantages of such use in localities where timber is cheap, coupled with the further benefit of being enabled to secure an increase of gas consumption, depending upon an extension of main facilities, where such increase could not be thought of if the company were obliged to lay iron pipes.

My first experience with wooden pipes for gas conduits was had in Fond du Lac, Wisconsin, when engaged in rebuilding the gas works there, for Jesse Beckley, of Cincinnati, Ohio, in the years 1867-8. We laid, at the outset, 1,200 feet of 6-inch, and 4,000 feet of 4-inch, "Robbins Patent Joint"

cast iron pipe, which cost, with freight charges from Covington, Ky., $73 per carload, or rather more than $1.60 and $1.10 per ton respectively. Just about that time a wooden pipe for gas mains was being extensively advertised, and we wrote to the manufacturers for a sample of it. It was coated inside and outside with an asphalt preparation. The sample was handed to a manufacturer of wooden pumps, doing business in our city, and he told us that he had no doubt a good class of sound pine timber, properly turned and bored, well tarred on the outside, would be thoroughly efficient for the purpose we required.

Accordingly we contracted for a considerable quantity of such pipe, which we put into the ground in the usual way. The following year Mr. Beckley tried the experiment of using pipes made from tamarac, being led thereto on account of that wood being considerably cheaper than pine. The results of the tamarac venture were disastrous, inasmuch as, at the end of about two years, the tamarac pipes were found to be in a very leaky condition, having been seriously affected by rotting. On the other hand the pine wood pipes had stood the test so well, I was quite satisfied mains made from that material could be successfully used.

In the year 1870, in conjunction with some other parties, I became interested in the organization of a gas company in Green Bay, Wis. At this place none other than wooden pipes were laid in the system of street mains proper—in fact, the only iron pipes used were those leading from the station meter to the gas holder, and from the holder to the street valve. I have used these wooden mains there ever since; and, to this day, I have not found a pipe, made of good, sound, white pine timber, rotted out, nor in any manner unfitted for a perfect distribution of gas.

It is preferable to manufacture your own pipes, both as a matter of economy, and insuring the employment of good timber. At first (during the months of November and December, 1870,) we had our pipes made in Fond du Lac, shipping them from thence to Green Bay; the following spring or summer (1871) we had a second lot made there, but, owing to the excessively hot, dry season then experienced, by the time of receipt they were air-checked and unfit for use. When manufacturing your own pipe you know the sort of timber that is employed, and that every length, before being coated with tar, will sustain a water pressure.

The methods and machinery necessary for the production of wooden gas mains are few and simple—the latter involving very little expense, consisting of a plainly constructed lathe and a set of boring bits. The shears of our lathe, as also portions of the head and tail blocks, are made of heavy hard timber. Attached to the head block is a chuck into which is clamped the log to be bored—the chuck being capable of receiving a piece of timber of from 6 × 6 to 4 × 4 inches for pipes of 3 and 2-inch bore respectively. For larger pipes a chuck of greater dimensions may be used. The other end of the log is driven into a steel ring attached to a tail block, the diameter of the ring varying with the size of the bores of the pipes. The log is now ready for boring. The bit is run one-half the length of the log, then withdrawn, and a reamer, one size larger than the bore of the pipe, is run in, to the depth of 8 or 10 inches, for the socket—say, for a 3-inch pipe use a 4-inch auger. The end is then turned for the iron band. The log is now placed end for end and bored clear through, and the extremities turned about six inches, tapering from about 4¼ to 4 inches for a 3-inch pipe, which will make a good joint. In boring, of course, the log revolves, and the auger is keyed to an easily adjusted iron rod.

After the boring operation is completed the pipes should be covered with the chips or shavings resulting; the pipes should also be kept thoroughly dampened from the time they are prepared until laid in the ground. They should be laid as rapidly as taken to the trenches, particular care being taken to prevent exposure to the sun's rays.

In laying the pipes I make the joint with equal proportions of white and red lead mixed with linseed oil. The sections are driven together with a hard wood maul that fits into the end of the pipe; the maul, being surrounded with an iron band to prevent splitting, is struck with an ordinary sledge.

For crosses and tees, I use timber one size larger, which allows me from 1½ to 2 inches for jointing the pipes. In making service pipe connections I use the ordinary wood brace and bit; and the connections are easily put in, as the pipe makes its own thread in the mains. In my early use of the wooden pipes, I discovered that the metal was speedily eaten away at the end of the service where it connected with the main. This circumstance causing me considerable trouble, I mentioned the difficulty experienced to a foreman in one of our large machine shops. When I had detailed the particulars, he said, "Why do you not follow the practice pursued by the brewers?" I asked him what the brewers did, receiving the following reply, "The brewers use brass pipe, because the acid in the wood eats up any iron pipe put in." I immediately acted upon the hint, and the trouble immediately ceased. I use brass nipples for connections between service pipes and mains.

Here before you you see a sample of service pipe that has been in use for the last thirteen years; and, with the exception of the trouble from the service pipes, I have had nothing whatever to complain of in the matter of employing wooden pipes for gas mains. Indeed, when putting down mains varying from 3 to 6 inches in diameter, I am free to say that I prefer the use of wooden mains to any other description of pipe now made.

At Green Bay we have all natures of soil—black sand, clay, sawdust, and quicksand—in some of which it would be next to an impossibility to lay cast iron pipes, and make a tight lead joint, in the trench. We have only to bury the pipes at sufficient depth to prevent the action of the frost upon them—they will not break, like cast-iron pipe, nor tear apart, like wrought-iron pipe; when the frost gets under them they raise up and open at the joints. Our percentage of loss from leaks occasioned by frost distubances does not, I think, amount to as much as that taking place when using cast or wrought iron pipes.

As to the cost of wooden gas mains, I would say we pay $20 per thousand for such timber as may be safely used—a good sound knot does not hurt timber for this use. Timber at $20 per thousand makes the cost of 6 × 6 inch outside diameter (or 3-inch bore) 6 cents per lineal foot; 8 × 8 inch (or 4-inch bore) 10 cents; and 10 × 10 inch (or 6-inch bore) from 18 to 20 cents per lineal foot. To this should be added 1 cent per foot, for boring, tarring and banding the ends. For the last-named purpose I use one inch by three-sixteenths band iron.

You may ask, "How long will wooden pipes last?" I am unable to answer this question definitely; and can only say that, at the present time, our pipes do not seem to be any less serviceable now than when first put down; on the contrary they appear to have grown harder, since I find it more difficult to bore into the old pipe than the new.

Last March I read, in the Chicago *Daily Times*, an account of a piece of wooden water pipe that had been laid in 1844. The writer said the specimen appeared to be perfectly sound in every particular, and that it had been adjudged worthy of a place in the collection of the Illinois State Historical Society. I have no doubt, however, that wooden pipe will last long enough, and do satisfactory service, until the town of Green Bay has grown to the dimensions when its inhabitants will demand a greatly increased supply of gas, thus necessitating the installation of much larger diameter of distributory mains than now suffices for its needs.

Discussion.

When Mr. Miller had closed the reading of his paper, Vice-President Lansden resumed the chair. He announced that discussion on the paper just presented was in order.

Mr. Scofield was the first speaker. He said he had some experience in the use of wooden pipe when he was connected with the Freeport, Illinois, gas works. He bought about 3,000 feet of wooden pipe from a manufacturing concern in Bay City, Michigan, and supposed it was made out of good timber. After it had been down about two years trouble from leakage was experienced, and an investigation proved that the woody fiber had rotted out. In some places the mains were so soft that nails could be pushed into them with hand pressure only. How large a proportion of the pipe was in this condition he did not determine, since what he had already seen was enough to utterly condemn it. He replaced the wood with cast iron. It was pretty certain that proper timber was not used; it being either tamarac or hackmatack, with the further fact that the sections which rotted out soonest were bored when "green." He would say, however, that some portions of the pipe, at the time of taking up, were perfectly sound. When taking possession of the Fort Scott (Kansas) gas works two years ago, considerable complaint about leakage was made, and the trouble was traced to a section of the supply mains where wooden pipes had been put in. He (Mr. Scofield) had these wooden pipes stripped, and repacked the joints with a mixture of red and white lead, with the result that the leakage trouble was remedied. A year after that was done, the authorities determined to repave the streets when the pavers reached the section containing the wooden mains he ordered his men to remove them and replace them with iron. He thought portions of the removed wooden pipes were afterwards employed as water pipes. He would not care to use wooden pipes for gas mains, and should not think it would be profitable for others to do so.

Mr. Smith corroborated Mr. Scofield in regard to the matter under discussion. He stated that at a gas works of which he had charge at one time some three or four miles of wooden supply mains were laid. Everything went along smoothly for a comparatively short while during the fall and winter seasons; but when the ground became softened up, in the following spring, leaks were discovered in every direction—in fact, it was like sending gas through a cotton bag. It need not be added that iron was at once substituted. He did not see what benefit was to be obtained from an inside coating of asphaltum, as gas would destroy any preparation of that nature. He gave, as an instance of the truth of this, an illustration by stating that he had contracted with an Eastern firm for four carloads of 4 and 6-inch iron pipes, specifying that each length was to be dipped in coal tar. This he expected was to have been a great improvement, but in about a month or two after it

had been laid every drip along the line of pipe was filled with a pitchy substance. The action of the passing gas had completely stripped off the coating. He had tried enameled pipe with the same result. He knew of many wooden water pipes in his city that were doing good service; but he could not say anything in favor of the practice of installing wooden gas mains.

Mr. Spencer stated his experience with wooden gas pipe did not materially differ from that of the previous speakers; still he would like to say a partial word in its favor. He laid about a mile of wooden pipe, when cast iron pipe was worth nearly $70 per ton. The pipe was made in Bay City, Michigan, and was in bad condition when it was delivered. His need was such that he put it down—although he had noted that some of it was made from unseasoned material. His experience was similar to Mr. Smith's, as the inside coating was carried to the drips, but he did not think that any very great objection to its use. After six or seven years use it began to leak. In due course of time the wooden pipes were all taken up, and in the process of removing many lengths were taken out that were perfectly sound. Notwithstanding the bad results of his trial he believed that, when made from thoroughly sound and properly seasoned material, wooden gas mains would answer perfectly the duty of gas distributers.

Mr. J. O. King said he had laid a mile of wooden pipes nearly fifteen years ago; it had been under suspicion a good many years, but he had never had very great loss from leakage in it. The real trouble that he found was at the joints; and this trouble he attributed to the fact of changes in temperature and conditions of moisture in the ground. When the earth dried rapidly, in spells of long-continued hot weather, the pipe drew away at the joints from shrinkage, and the contrary results happened during damp and rainy seasons.

Messrs. Coverdale, Douglas, Starr, Moran and Somerville also took part in the discussion, the general tenor of the arguments approaching closely to the portions reproduced.

[To be continued.]

Some Account of the Operations of the Paris (France) Gas Company During the Year 1883.

[Continued from page 268.]

Manufacturing Capacity.—During the year 1883, by reason of extensions to the plant, the Company was enabled, without trouble of any description, to meet all the demands made upon it for gas supply.

Mains.—In the course of the past year the Company made several notable additions to its system of distributory mains, through the aid of which improvements the gas manufactured at the new station at Clichy can be delivered in the very heart of the city of Paris. The main laid for this purpose is one meter (39.370 inches) in diameter, and 5,409 meters 50 centimeters (33 3-5 miles) in length, costing 850,000 francs, or $167,025. The total length of mains was increased by 57,472 meters, distributed as follows:

In city of Paris	31,128.30 meters, or 19 1-3 miles.
Suburbs	26,343.85 meters, or 16 2-5 miles.
Total	57,472.15 meters, or 35 11-15 miles.

The entire length of conduits placed under the public streets and roads, up to December 31, 1883, is about 2,024,890 meters, distributed as below:

In city of Paris	1,394,831 meters, or 866.7 miles.
In suburbs	630,059 meters, or 391.5 miles.
Total	2,024,890 meters, or 1258.2 miles.

Installation Expenses.

The installation expenses apply to the extension of plant and the distribution of gas. The various works undertaken during the last few years looking to the provision of adequate measures for supplying increased gas consumption demands are about completed.

The balance sheet shows in what manner these expenses are distributed through the different accounts. Here are some of the details:

Purchase of Lands—		
Net cost of lands acquired	835,912.42 frs.	$164,256.79
Works and Materials at the Several Stations—		
La Villette	879,518.25 frs.	172,825.53
Les Ternes	100,088.57 frs.	19,667.40
Vaugirard	47,467.99 frs.	9,327.46
Ivry	373,920.58 frs.	73,475.39
Sainte Mande	1,155,823,72 frs.	227,119.36
Clichy	1,473,075.31 frs.	289,459.30
Le Landy	2,668,474.90 frs.	524,355.32
Tar Works	632,613.00 frs.	124,308.47
Chemical Works	273,429.81 frs.	53,789.96
Office extensions	184,400.80 frs.	36,234.78
Miscellaneous charges	108,526.73 frs.	21,285.50
Mains, Fittings, Etc.—		
Mains	2,216,613.33 frs.	435,564.52
House services	1,125,616.81 frs.	221,183.70
Fittings	566,599.90 frs.	111,336.88
Meters	86,816.66 frs.	17,059.47
Materials, tools, transportation, etc.	284,208.73 frs.	55,847.02
Perfecting titles, rights, etc.	157,706.04 frs.	30,989.24
Total expenses, 1883	13,256,456.61 frs.	$2,604,893.72

The total expenditures of the main establishment up to close of 1882 were 224,729,233 frs. 34 c., or $44,159,294.35. As shown above, there was expended during 1883 the sum of 13,256,456.61 frs., or $2,604,893.72, making a grand total expended up to date of December 31, 1883, of 237,985,688.61 frs., or $46,764,188.07. As an offset to this expenditure the Company has a share and bond capital of 256,245,739 frs., or $50,352,287.74, showing a balance in favor of the Company's treasury of 18,260,049 frs., or $3,588,099.67. There has been paid back to stock and bond holders, in the shape of dividends to both classes of holders, the total sum of 34,566,083 frs., or $6,792,231.39, leaving still to be redeemed a total of 221,679,676 frs., or $43,560,056.33.

Working Account, 1883.

Expenses—		
1. Materials, etc	26,366,513.63 frs.	$5,181,019.93
2. Labor at works	8,357,627.27 frs.	1,642,548.86
3. Labor, lighting and on mains	2,959,003.27 frs.	581,444.14
4. Central administration	14,417,992.39 frs.	2,833,131.50
5. Municipal charges, taxes, etc	5,880,319.78 frs.	1,155,482.84
6. State charges	892,917.79 frs.	175,462.35
Total	58,875,774.13 frs.	$11,569,089.62
Receipts—		
Value of gas on hand January 1, 1883	44,191.00 frs.	$8,685.53
Sales of gas	73,085,263.28 frs.	14,361,254.23
Residual products—		
Coke from retorts	15,827,502.74 frs.	3,110,104.29
Coke from furnaces	154,490.60 frs.	30,357.40
Tar	2,989,494.40 frs.	587,435.65
Ammoniacal liquor	2,036,127.93 frs.	400,098.14
Rent of meters	1,124,775.43 frs.	221,018.37
Rent of fitttings	986,084.37 frs.	193,764;58
Rent of fixtures and burners	493,283.25 frs.	96,930.16
Fire bricks, etc	293,579.43 frs.	57,688.36
Sundry matters	238,943.88 frs.	46,952.47
Interest and open accounts	788,144.55 frs.	154,870.40
Total receipts	98,061,880.86 frs.	$19,269,159.58
Take out expense of 1883 working	58,875,774.13 frs.	11,569,089.62
Showing profit for year of	39,186,106.73 frs.	$7,700,069.97
To which add balance on hand from 1882	197,867.77 frs.	38,881.02
Giving a total of	39,383,974.50 frs.	$7,738,930.99
Deduct to meet outstanding claims	224,972.23 frs.	44,207.04
And a sum held in reserve on account of litigation	6,859,002.57 frs.	1,347,793.95
There remains for distribution, available for dividend, the sum of	33,300,000.00 frs.	$6,346,950.00

The report then details the various dispositions of certain sums, and these put to their proper accounts, a dividend of 55¼ frs. ($10.90) is ordered paid (paid April 6th last); an interim dividend of 12½ frs. ($2.46) per share was paid in October, 1883, making the total dividend for year equal 68 frs. ($13.36) for each share of capital stock. The balance carried forward to credit account of this year's (1884) working being 148,865.83 frs., or $29,252.14.

Residual Products, Etc.

Coke—The sale of coke proceeded even less favorably during the past winter than during the poor season of 1882. It is stated that both in Paris and the suburbs the production was greatly in excess of the demand to satisfy domestic consumption. In order that the residual might not accumulate in too great quantities in the yards of the various works of the Company, new markets, some at great distances from the sources of production, had to be sought after.

Heating Appliances.—In 1883 the Company sold only 1,582 stoves in which coke for heating is used. In 1881 the Company disposed of 2,295 coke stoves, and in 1882, 2,570 were disposed of. The total number of these stoves sent out from the Company's workshops, on date of December 31 last, was about 57,776.

Tar and Ammoniacal Liquor.—The receipts from tar and ammoniacal liquor amounted to 5,025,622.33 frs. ($987,534.79), and may be separated as follows:

Tar	2,989,494.40 frs.	$587,435.65
Ammoniacal liquor.	2,036,127.93 frs.	400,099.14
Total.....	5,025,622.33 frs.	$987,534.79

—or a sum less than that of previous year (1882) by 303,427.73 frs., or $59,623.55. The total receipts in that year from these same products were 5,329,050.06 frs., or $1,047,158.34. This decrease is due to the fall in price of sulphate of ammonia and anthracene.

Gas Engines.—During 1883 the Company sold seven Otto gas engines. The total amount of gas supplied to gas engines in the year 1883 was in the neighborhood of 106 million cubic feet.

The report then gives the working of the benevolent institutions of the Company, and these we will make mention of at another time.

Sawdust in Gas Manufacture.

By J. E. Bicknell, Cleveland, Ohio.

I have little doubt that Mr. Walker's article upon "Gas from Sawdust," which appeared in the Journal of the 2d of May, will attract widespread attention, especially among gas men in the lumbering regions of the country where sawdust is accumulated in immense quantities. For several years past I have been experimenting with reference to producing gas from sawdust, and have succeeded so well that perhaps a brief account of the process and apparatus found to give the most satisfactory results would be of interest—at least to that branch of the gas fraternity before mentioned.

I can verify Mr. Walker's statements relative to the amount of carbon and volatile matters contained in wood as compared with coal; and, as regards wood having been successfully used long ago as a gas producing material, I quote the following (with some abbreviations) from "Ure's Dictionary of Arts and Manufactures:"

"If pieces of wood be placed in a glass retort half filled with boiling quicksilver, at a temperature of 660° F., (at which quicksilver boils), a black lustrous charcoal is left, and the gas evolved is composed of—

Carbonic acid.....	56.4 per cent.
Carbonic oxide.....	36.6 "
Light carburetted hydrogen.....	7.0 "
	100.0 per cent.

"If, however, vapors and gases produced as above stated be heated to a considerably higher temperature, the volume of permanent gas is considerably augmented, whilst such an amount of hydrocarbons is produced as to render the gas actually richer in these constituents than coal gas. The illuminating value of the hydrocarbons was found to be one-half greater than an equivalent volume of olefiant gas. These observations prove that wood gas is indubitably entitled to rank among illuminating agents.

"The following analysis shows the composition of wood gas made on a manufacturing scale; No. 1 being a sample, before purification, at the works of the Munich Railway; No. 2 representing a specimen, after purification, manufactured in the town of Bayreuth:

No. 1.

	Per cent.	
Hydrocarbons	6.91 = 9.74	olefiant gas.
Light carburetted hydrogen...	11.06	
Hydrogen	15.07	
Carbonic oxide.....	40.59	
Carbonic acid.....	25.72	
Nitrogen	—	
Total.....	99.35	

No. 2.

	Per cent.	
Hydrocarbons.....	7.70 = 11.93	olefiant gas.
Light carburetted hydrogen...	9.45	
Hydrogen	18.43	
Carbonic oxide.....	61.79	
Carbonic acid.....	2.21	
Nitrogen.....	.42	
Total...	100.00	

"The gas is entirely free from all sulphur and ammonia compounds, and possesses, according to Liebig and Steinheil, an illuminating power greater than coal gas in the proportion of 6 to 5."

Wood in the form of sawdust is better adapted for distillation, either for gas, acetic acid, or charcoal, than wood in the form of blocks or slabs, provided the proper apparatus is used, for reasons which will be hereafter noted. While the "old Halliday" process for making acetic acid, consisting of an Archimedian screw fitted into a retort, as described by Mr. Walker, and which could undoubtedly be adapted for producing gas, was indeed a novel idea, and possessed numberless advantages over any other process then in use, still does not carry into effect the principle which the inventor evidently had in mind—namely, the bringing of every particle of wood in the finely-divided state of sawdust into immediate contact with a certain heat sufficiently high to instantly carbonize it and drive off all the volatile matter, and then quickly remove the resultant carbon, or charcoal, which, being a non-conductor of heat, would, if allowed to accumulate, greatly retard further carbonization.

As was before intimated, the screw only partially accomplishes this, because it is obvious that as the screw revolves it carries forward a layer of sawdust from five to six inches deep, depending upon the size of the retort, which is, as it were, wound round the screw, the same particles always remaining upon the outside and in contact with the surface of the retort, consequently becoming quickly charred, serve only to retard the carbonization of the interior. It has been found by the writer that an apparatus constructed and operated as follows combines all of the desirable qualities necessary to obtain the maximum results at a minimum cost.

The sawdust, being fed into a hopper, falls into a horizontal pipe provided with a piston working with an intermittent motion, which feeds the sawdust into a pan or retort set into a furnace. Into the interior of the furnace are fitted rakes and scrapers, attached to a shaft in the center. As the sawdust is fed through the horizontal pipe it falls into the retort, is spread and stirred upon the red-hot bottom in a very thin layer by the rakes, and all of the volatile gases instantly driven off. In the meantime the resultant charcoal is carried around to an opening in the bottom of the retort, where it falls into a suitable cooling chamber. Simultaneous with this operation more sawdust is being fed and spread upon the bottom, as before.

The gases and vapors are taken off through an ascension pipe, and conducted through the superheating chamber, where any condensable vapors are converted into incondensable gas. At this point a small amount of hydrocarbon vapor is injected, the whole being thoroughly mixed and converted into a fixed gas of high illuminating power. Oil at the rate of 2½ gallons per 1,000 cubic feet of wood gas was used, and a sample of the commercial gas, tested by Mr. G. A. Hyde, Engineer of the Cleveland (Ohio) Gas Light and Coke Company, was pronounced to be of 24-candle power. One machine will produce 117,459 cubic feet of gas, and 3,835 pounds of charcoal, using 19,176 pounds of sawdust. The feeding and removing of the charcoal being accomplished automatically, the only labor required is that of firing, which can be done by one man.

The Platinum Unit of Light.

The London *Journal*, in discussing this subject, says—

"When, during the Paris Electrical Exhibition in 1881, the plenipotentiary electricians of the world met in conclave, to discuss and settle various fundamentals of their revivified science, they found it necessary, in the first place, to agree upon the alphabet and notation of electrical forces and quantities. It was found that physicists of different nationalities had conflicting names for the same things; and some of this confusing nomenclature was corrected on the spot. In at least one important point the nomenclature of British electricians had to give way; but the change was easily effected. British philosophers having already adopted the metrical system, further concession to the Continental, or, more properly, French tone of the Congress was made as soon as asked. Among the other matters in which the influence of the *genius loci* was shown, was the adoption, by the international electricians, of the Carcel lamp as the provisional standard unit of illuminating power for the photometry of electric lamps, and inferentially of all other light-sources. The Carcel standard was only accepted provisionally, and because the assembled philosophers found that they could not, on the spur of the moment, evolve a better. It does not say much for the weight of their opinion in this matter that electric lamps of the two leading kinds in England and America (where they are more used than anywhere else in the world) are to this day valued by the standard candle, the Carcel unit being wholly ignored. It was the unanimous opinion of the congress of 1881, however, that all existing standard units of light were bad, and that a new one, possessing the prime quality of constancy or certainty in reproduction wherever and whenever required, should be originated.

"Prominent in the discussion of this matter in 1881 was Mons. Violle, who suggested that the requirements of the congress might be satisfied by

the light emitted from a known area of surface of a metal—say, of platinum—at the point of fusion. The idea was favored; and M. Violle was encouraged to carry it into practice and report at an adjourned meeting of the congress. The first work undertaken with this object by M. Violle was to test his theory (upon which the suggested standard was based), that the light emitted by a metal at the point of fusion is constant during solidification. As already described in the *Journal*, these preliminary experiments were made with molten silver; and, according to the indications thus obtained, the principle was justified. M. Violle has now completed his task; and at the recent meeting of the Congress of Electricians his standard was adopted as the international standard unit for photometry.

"M. Violle has communicated to the *Comptes Rendus* an account of his standard, and from this the following particulars are taken. He says: 'I take as absolute unity of light the radiation emitted by a surface of one square centimeter of platinum at its point of solidification.' By augmenting the surface, any determined multiple of the unit may be obtained. The Carcel lamp, of the Dumas and Regnault type, having been adopted as the customary secondary unit, it was necessary, in the first place, to establish the relative value of the two types. By different methods resulting in satisfactory concordance, M. Violle found for the value C of the normal Carcel $C = \frac{1}{2.08}$. Whence it appears that, in proportion to the illuminating surfaces in the two types, the intrinsic intensity of the new standard is nearly eleven times that of the Carcel.

"Experiments have also been conducted with electric lamps; the comparison being described as very satisfactory in practice. But in this communication M. Violle confines his remarks to the tests with incandescent lamps, because their constancy and color render comparison with the platinum very easy and sure. The Swan incandesent lamp used in these trials was maintained by a battery of 30 Kabath accumulator cells. A resistance box interposed in the circuit permitted of modifications in the performance. The electrical measurements were made with the greatest care, to obtain results deduced from electrical measurement, and therefore independent of possible variations of the Carcel lamp. The comparison was made by means of a Bunsen photometer on a horizontal scale 4 meters long between the two light-sources. The rays emitted vertically by the platinum were reflected horizontally by a mirror at 45°; the total effective distance being about 4.5 meters, carefully measured every time. In the first experiment three different observers each made six readings. The mean of the 18 readings thus obtained was 7.023. In another experiment the working of the lamp was more varied, and the mean of 12 readings was 6.986. The photometrical readings accorded very well with the electrical measurements; giving for the normal Carcel $C = \frac{1}{2.07}$, or very nearly the same value as was found by direct comparison. In conclusion, therefore, M. Violle declares that 'platinum at the fusing point fulfils the conditions that may be required of an absolute standard of light. It is based upon a physical phenomenon perfectly defined and constant; and, being of a convenient size, it constitutes a term of practical comparison with the customary standards.'

"This, we may be assured, is the best that can be said for the platinum standard; for it is advanced by the author after three years' study, and in face of its acceptance by so much of authority as belongs to an International Congress of Electricians. It gives rise to various reflections on the part of those whose practical interest in a photometrical standard is greater than that of electricians—whose very last desire it is to sell light by absolute measure, however much they may desire an infallible standard for laboratory use. This last phrase, as many people may be inclined to think, gives a character to the new standard. It is obviously a laboratory method, and a very well-appointed laboratory to boot. Before forming an opinion respecting the 'practical' nature of his standard, for which M. Violle so strongly contends, it would be necessary to see the thing in use in his laboratory, or to hear him lecture upon it with suitable demonstrations. In any case, the preparation of the standard must be troublesome and costly beyond any other, not excepting the pentane gas standard, which must be utter simplicity by comparison. And as it necessitates the use of an angular mirror, it would appear that M. Violle's idea is not that the platinum is a standard, but the platinum qualified by the co-efficient of absorption of the mirror. The question of the mirror is one to make a practical photometrist shake his head; especially when he thinks of humid air and a cold glass. Of course, in a perfect laboratory there should be no question of the sort; but this argument leads back to the starting-point. Take the inferential conditions of staff and establishment into account, and what is the cost of the platinum standard?

"It is to be accepted, upon M. Violle's authority, that the principle of his standard is correct, and that fused platinum, upon the point of solidifying, will always give the same light during a period convenient for photometrical measurements. This is really all that he has to say on behalf of the standard; for all the other desirable conditions of cheapness, handiness, portability, and facility of reproduction wherever a test may be required, are absent. It must be said that the circumstances amid which the new unit has been devised and accepted are not so satisfactory as they might have been. M. Violle is probably a trustworthy experimentalist; but, all the same, it might have been wished that some independent authority had been intrusted with the tests of his suggested unit. It is scarcely necessary to cite examples to show how the mere suspicion of bias on the part of an experimentalist has vitiated the results of his observations. Here there is every reason to suspect the existence of such prejudice as an inventor naturally entertains for the fruit of his creative brain; and consequently all that he says in favor of the platinum standard will be taken with a great deal of 'salt.' Briefly, the whole thing has too much the air of being made to order, and taken on trust by the people for whom it was prepared. It is as much a private proprietary article of M. Violle's as though he had patented it; and something more is wanted for the warranty of what is ambitiously styled an absolute unit of light. It remains to be seen whether other photometrists will share M. Violle's admiration of melted platinum.

"It will be useful to note that, assuming the Carcel lamp to be equal to 9·5 English standard candles, the value of the platinum standard is 19·665 candles; and it is consequently the most powerful unit yet proposed."

A Substitute for Candles in Testing Gas.

By Frederic Egner.

When, in the infancy of the gas maker's art, sperm candles were designated as the standard of comparison, there were undoubted good reasons for the course taken; but the day of the candle is past, and the reasons are now no longer good for adhering to the use of an almost obsolete article in making comparisons of the illuminating power of gas. That the use of the candle in the photometer room is not satisfactory is shown, to quite an extent, by the fact that some of our trans-Atlantic friends—gas engineers of world-wide reputation—have, for years past, been engaged in conducting experiments with a view to finding a substitute for the standard candle, which would prove of greater accuracy and reliability.

One of these experimenters proposed to employ, instead of the objectionable candle, a high grade naphtha, which could be readily vaporized. But, why not use kerosene? This oil, of good quality and even grade, is easily obtained; is not affected by ordinary variations of temperature; can be readily controlled as to height of flame and quantity consumed; is the illuminating vehicle generally used by the people; and, furthermore, it is that oil which is also the strongest rival of gas light, by reason of its adaptability and apparent cheapness. Because kerosene is one of the most powerful rivals of gas lighting, can that possibly be advanced as a reason why its use should be avoided as a standard of comparison? On the contrary, in the opinion of the writer, that is one of the chief reasons why it should be so used. Having given a number of reasons in favor of a kerosene standard as against the old standard candle (which few but professional gas men know anything about in this progressive age), the following average results of a series of experiments, made by the writer, and bearing directly on this subject, may be of interest.

The gas, tested on a Bunsen photometer, supplied with all the requisite appliances, and a London Argand burner (No. 1, 24 holes), averaged 21.65 standard candle power. A kerosene lamp was then substituted for the candles, and the gas shown to give a light equal to what, for convenience, we may call 1.95 lamp power. The burner used on the lamp was of the kind known as No. 2, and said to be one of the best specimens of the sort commonly used. The oil used is of the brand called "Elein," fire test 150°; and a half pint of it weighed 3,000 troy grains. The flame was one inch wide at the base; one and one-half inches at the top; and was regulated to a height of one and one-eighth inches. When adjusted to the height mentioned it consumed 500 grains of oil in one hour, and 83⅓ grains in 10 minutes. The consumption of oil was remarkably uniform, though tried on different days, and for hours together. So also on the photometer; while with the candle the results varied, at times, three candles in a period of 10 minutes. When using the lamp, the position of the photometer disc, once fixed, it was not found necessary to alter it; no matter how frequently moved, on readjusting, the disc would be found in the same place it was before.

It may also be shown, from the foregoing, that the claimed relative greater cost of gas over oil illumination is decidedly more fanciful than real, even if we consider that the greater fire risk involved, and frequent loss to life occasioned by the explosion of the kerosene lamp, counts as naught. If the losses by fire caused by lamp explosions were counted against kerosene, it would be found that after all gas would not only be the more agreeable, but the cheaper, illuminant as well. Then, why not throw over the obsolete, unreliable candle, and employ a good kerosene lamp instead, allowing our gas

to be known by its lamp and not by its candle power? Consumers would then more readily understand the gas man; and, surely, gas would have nothing to fear from the comparison—indeed, the chance of gain would seem to me to be great.

Fireproof Paint.

The *British Mail* notes that at a recent meeting of the Royal Scottish Society of Arts, held in George street, Edinburgh, Mr. S. B. Wilkins, fire-master, read a brief paper descriptive of a fireproof paint which he has invented. Within the last few years there had, he said, been different paints introduced for the purpose of resisting fire, and several large buildings had been coated with it, and a number of very successful experiments made. Among the objections raised against these paints were, that when they got dirty they would not stand washing, and that when wood-work was once coated with them, oil paint would not dry on them. They were also very expensive, and did not keep their color long when exposed to a strong light. His invention was particularly serviceable for painting all wood-work in connection with the roof, stage, and scenic appliances in theaters and other places of amusement, and would also be found invaluable where wood was extensively used in the construction of stairs, hoist-ways, the shelving and lining of rooms, and in painting offices and public buildings. It would also exclude insects, and was non-poisonous; and the painted wood-work could be washed by having a coat or two of oil-paint over the fire-proof composition without in any way destroying its properties as a fire resisting material. There was no asbestos used in the manufacture of the paint. Mr. Wilkins subjected several pieces of wood coated with his paint to the action of fire, and all stood the test admirably. One piece was thrust into the heart of a strong fire, and after remaining for over 10 minutes, it was only blistered. A gas flame was applied to some half-dozen others for an hour and a half, but, beyond being slightly charred on the outside, there was no injury done to the wood, which had never taken fire. In one instance, the paint was cut away from a part of the wood, so as to expose it to the flame in its natural state, but the fire made no progress whatever, the outer coating of paint proving sufficient to resist the heat. The cost of the composition, Mr. Wilkins stated, would be one-third less than that of ordinary paint, and he expressed his belief that, with a paint-mill, it could be turned out with profit at from 12s. to 15s. per cwt.

Protecting Iron from Rust.

An English author, who has given much attention to the study of this topic, says it is still an open question how best to protect iron against oxidation, commonly known as rust. He who would find an effective preservative would indeed be a benefactor, for by its means numerous noble structures into which the tooth of time is now eating slowly but surely would be preserved to posterity. It is well known that wherever air and damp come into contact with even the smoothest iron surface rust soon makes its appearance. By its operation not only is there a constant waste going on, but the remaining iron is rendered brittle. A coating of less oxidizable metals, such as tin, later lead and zinc, and quite recently nickel, has, therefore, been applied, and with some effect. Earthy glazes, such as are applied to pottery, have also been used for coating iron vessels for household purposes. But all these coatings of metals or glazes have been found in most cases either impracticable in application or too expensive. For extensive use, coatings consisting of oils mixed with metallic oxides, earths, etc., have thus come into use.

Now, it has been observed that iron does not rust in dry air, even in dry oxygen. Iron, also, frequently does not suffer when exposed, without being painted, to the air—weather-cocks, fences, etc., having lasted for centuries. But in that case it has been found that they have been protected by the formation of a thin layer of peroxide of iron, which has acted as a safe-covering against exterior influences. This experience led to the artificial production of a layer of magnetic oxide, superheated steam being used for the purpose. It is not to be supposed that such a treatment will find extended application, and a protective covering obtained in this way would only be effective in the case of iron in pure air, but not where it comes into repeated contact with water or carbonic acid. An interesting phenomenon has likewise been observed on railways. It has been found that iron sleepers and spikes rust very much if the line is not used for some time. It is assumed that iron bodies are more liable to rust in a state of rest than if they are exposed to vibration from time to time, in which case, perhaps, an electrical effect comes into play which lessens the affinity of iron to oxygen.

In demolishing old buildings there are often found iron cramps, blocks, etc., which, so far as they are surrounded by mortar, are completely free from rust, just as if they had only left the forge. A similar phenomenon had been met with by M. Vicat, a French engineer, when he had the anchor fastenings of several suspension bridges exposed which had been put down 30 years before. Where the iron in the masonry was surrounded by rich lime mortar there was not a sign of the formation of rust, while the continuations of the anchors in hollow spaces were rusted to such a degree as to have lost two-thirds of their former dimensions. It has been frequently observed that iron does not oxidize in water if small quantities of caustic alkalies or alkaline earths are solved in it, in which case acids of whatever nature would be excluded. It appears that the above experiences have served as the basis for the rust-protective paints invented by Herr A. Riegelman, of Hanau (Bavaria). He adds to his paints caustic alkaline earths (barytes, strontian, etc.) By coating iron with them it is said to be in the same state as the anchors of suspension bridges in lime mortar. Although simple coatings of such paints, owing to thickness, cannot contain much alkaline matter, as is the case in walling in iron, alkaline effects will show themselves as long as they contain a certain percentage of it. But in any case those paints are free from active acids, which cannot be said of all our paints for iron. Should the paint be found in practice to possess the protective properties claimed for it, a step in advance would have been taken in the preservation of iron, and its greater application would be insured.

Corrosion of Cast Iron Pipes.

Mr. McElroy, while handling the above-named subject in a paper read by him before the Western Society of Engineers, claimed that a likely cause of corrosion in cast iron pipe was to be traced to the class of raw material employed, with the defective systems of manufacture pursued in ordinary foundries greatly aggravating the original trouble arising from the use of inferior pig.

In the first place, a cheap and easily melted pig is selected—specifications and the inspection of quality and mixture not being strict—and the castings (for convenience of handling) are generally made in greensand moulds laid at a slope of about 10 degrees from the horizontal. Impure metal is therefore run in a way that aggravates its defects. The core bars are coated with straw ropes, which may be more or less soft and loose, coated with loam more or less soft and wet, and sprinkled with sand.

If not very carefully wedged, these bars will rise; and they are seldom stiff enough to resist the upward pressure of molten metal. The usual spring at the center for the core of an 8 inch pipe is 1-16 or ⅛ inch; or as much as 3-16 inch with a 6 inch pipe. The metal, poured in from the upper end, first fills the lower section of the mould; and as it rises round the core to fill the upper section, its weight springs the bar upward to the extent indicated, making the casting thicker at the lower, and thinner at the upper side. The denser, hotter, and purer metal fills the lower portion; the impurities naturally floating upward to settle in the thinner metal as it cools. Here gather portions of the sand coating of the mould; while the bubbles of the metal, caused by the development of gas from the vegetable matter of the loam, and from its dampness, tend to prepetuate themselves in blisters and air cells.

The usual defects in these cheap castings are, therefore, inequality in thickness, air cells and blisters, sand holes, cold chutes from chilled metal, and mixtures of sand and iron. Such pipes are also frequently out of line, from the effect of unequal contraction. Pipes of this description are peculiarly liable to corrosion; containing as they do mixtures of metal of different densities, together with much graphite. The duration of such pipes in the ground is largely affected by the amount of disturbance they receive. If well laid at a good depth, and thoroughly packed, they may continue serviceable for many years; but their defects are likely to become suddenly prominent upon comparatively slight external interference. In favorable circumstances they may last more than 30 years; but the majority if tested after less use will show flaws that would have insured their rejection if detected when new.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Annual Meeting of the Newark (N. J.) Gas Light Company.—The annual meeting of the Newark (N. J.) Gas Light Company was held at the offices of the corporation, No. 9 Bank street, on Monday, June 9. The election for directors for ensuing year resulted in the choice of Messrs. Ira H. Harrison, Edward H. Wright, Theodore Runyon, S. H. Plum, Eugene Vanderpool, John R. Emory, Robert Balantine, M. L. Ward, and John I. Young. When the directors met to organize the board, they committed themselves to a course which will be more than pleasing to every gas engineer in the United States. The success attending the operations of the Newark Gas Light Company (and we state it without hesitation or reserve) is to be attributed to the skilful management of Mr. Eugene Vanderpool, whose fame as an engineer extends to other countries than our own; and the new board of direction, in selecting this gentleman as the future president of the com-

pany, has but done simple justice to the official who, in his engineering capacity, has placed the Newark Gas Light Company's plant and service among the model ones of the present time. The fraternity will join with us is extending hearty congratulations to Mr. Vanderpool upon his well deserved promotion.

A Large Gasholder for the Chicago (Ill.) Gas Light and Coke Company.—The following rather goes to show that the old Chicago Gas Light and Coke Company is not disposed to vacate the field of gas supply in Chicago, nevertheless and notwithstanding the "brag and bluster" indulged in by the promoters of the opposition movement in that city. Contracts have been given out by the company for the erection of a gasholder of the following description: The vessel is to have three lifts, of 35 feet each in height. The diameter of the inner section is to be 156′; middle section, 158′; outer section, 160′; diameter of tank between guide plates, 162′; depth to bearing stone, 35′ 3″. The holder is to be covered in by a brick structure measuring 166′ inside diameter, and 108′ to the roof shoes. It will be erected immediately adjoining the other large holder of the company, and its calculated working capacity is figured at two million cubic feet. Many engineers are disposed to cavil at the assertion that an equivalent amount of gain is secured through the housing of gasholders, when compared with the extra cost thereby incurred. However much truth there may be in this denial, when made as to places where the climatic conditions are such as to insure moderately even temperatures, it certainly will not "hold water" if made in reference to situations (such as often obtain in Chicago), where, on some days of the winter season, or even late in the fall or mid-spring, a change of 40 degrees or over takes place in twenty-four hours. Under these circumstances the question of the wisdom of inclosing holders needs no argument to make it apparent. Indeed, unless in the extreme South, holders of any considerable magnitude should always be housed. Bartlett, Hayward & Co., of Baltimore, Md., are to do the work.

Cheaper Gas for Rock Island, Ill.—Mr. Wm. H. Judge, Secretary of the Rock Island (Ill.) Gas Light Company, has issued the following notice to the gas consumers of that city:

"In order to induce a greater consumption of gas, it has been decided to allow a discount on all monthly bills (of 500 cubic feet or over), if paid at the office of the company within five days after presentation. The new schedule will be as follows:

	Per Hundred.
Bills for less than 500 cubic feet	30 cents.
Bills for 500 and less than 1,000 cubic feet	27 "
" 1,000 " " 2,000 "	26 "
" 2,000 " " 5,000 "	25 "
" 5,000 " " 10,000 "	24 "
" 10,000 " " 20,000 "	23 "
" 20,000 " " 50,000 "	22 "
" 50,000 and upward	20 "

"All gas used for fuel purposes, and passing through a separate meter, will be charged for at the rate of 20 cents per hundred cubic feet.

"The above-named schedule will go into active operation beginning with consumption dating from 1st of next September."

This is the entering wedge; the beginning once made the correctness of the policy will speedily become apparent to the Rock Island folks.

What is the Matter with Elgin's (Ill.) Electric Light?—The people of Elgin have always had pretty rugged experience with electrical modes and styles of lighting. If we mistake not very greatly, Elgin was about one of the first points to be illuminated under the tower system; and Elgin's towers might be compared, in one respect, to the "Leaning Tower of Pisa," inasmuch as they "leaned;" but here the semblance ends, for the Elgin towers, on one or two occasions, "leaned" so far over that they fell. Nothing dismayed by such a trifling circumstance, the wonderful structures were rebuilt, and, so far, have stood the "test of time;" but they have utterly failed to stand the test of doing what they were constructed to accomplish—namely, assisting the electric current to light the streets of Elgin. Having borne the burden of darkness long and uncomplainingly, the taxpayers there are now disposed to seek relief, and the following petition, signed by 26 prominent men of the city, was handed, on May 19th, to the Mayor and City Council. It would be well to bear in mind that the streets named are prominent thoroughfares.

"We, the undersigned residents on Chicago, Gifford, Du Page, Fulton, and Prairie streets, would respectfully represent to your honorable body that the change in street lighting, from gas lamps to the tower system, has left a great portion of the above-named streets in total darkness—or nearly so; and believing that every taxpayer should receive some benefit from moneys paid in taxes, respectfully petition your honorable body to cause the above-named streets to be lighted with gas lamps, believing the pursuance of such a policy would be but true economy, and give real satisfaction to all concerned."

This style of language is plain enough to be convincing, and may be put upon record as going to prove how far the "light of the future" is from being the "light of the present."

Price of Gas Reduced by the Jamaica Plain (Mass.) Gas Light Company.—In our "Item" columns of last issue we gave some extracts from the Annual Report of President Jno. C. Pratt to the stockholders of the Jamaica Plain Company. In referring to the fact that the dividend earned during the year 1883 was not impaired through the reduction of 25 cents per thousand, Which reduction was made on April 1st, 1883, Mr. Pratt said: "This is a gratifying result, and proves the wisdom of that reduction. It is to be hoped that before long the directors may be enabled to grant a still further reduction." Well, the hope was speedily realized, for on May 26th last Mr. Pratt appears to have convinced his brother directors of the expediency of a pursuance of the policy of lowering selling prices, since he caused, on that date, the publication of an announcement that "a reduction of 25 cents per thousand cubic feet in the price of gas will be made from and after the first day of July next." Brother Pratt "means business" every time.

A Thoroughly Sensible Idea.—The Indianapolis (Ind.) Gas Light Company has instituted an excellent plan, that consists of calling attention to the easy manner in which the dangerous, troublesome, ill-smelling, and filthy gasoline cooking stoves may be converted into gas cookers, by simply substituting different burners—in other words, replacing the gasoline burners with good, serviceable gas burners. The cost of such alteration is trifling, and many a housekeeper who formerly used a gasoline stove, and, from the annoyances experienced in its employment, relegated it to the mysterious precincts of the "garret storehouse," would only be too glad to know that such a transformation could be made. We would suggest that the practice of the Indianapolis Gas Company, in regard to this matter, is well worthy of imitation.

The American Meter Company's Agency, at Chicago, Ill., Removed to New Buildings.—It is with pleasure we announce to the fraternity that the branch of the American Meter Company located at Chicago, Ill., has been removed from No. 20 South Canal street to the Company's new building, at Nos. 244 and 246 North Wells street, in same city. The constantly increasing magnitude of the Company's trade in the West rendered this step a matter of imperative necessity. A full line of goods will be kept in stock. May they always be troubled with the same complaints—growth of business, and an intelligent appreciation of how to meet the wants of the gas men.

Price of Gas Reduced by Hudson (N. Y.) Gas Light Company.—The Hudson Gas Company, of Hudson, N. Y., was rather slow to join the ranks of the reducers; but when it did determine upon taking the decisive step it took it in no uncertain manner. At a meeting of the directors, held May 19 last, Mr. E. Gifford, Jr., Secretary and Treasurer, was empowered to notify the Hudsonites that on and after July 1st, 1884, the price of gas would be reduced to $2.50 cents per thousand cubic feet. To understand the "true inwardness" of this proceeding, it need but be stated that the price heretofore charged was $3.50 per thousand. There is a great deal more money to be made in Hudson by selling gas at $2.50 than $3.50 per thousand—at least, that is the way it strikes us; and the books of the Hudson Gas Company, before the first day of January, 1885, is reached, will amply bear us out.

The New York Mutual Company's Works Damaged by Fire.—At an early hour on the morning of June 9 fire was discovered in some portion of the New York Mutual Gas Works, located at foot of East Eleventh street, New York city. Before the flames were extinguished considerable damage was occasioned. The cause of the conflagration is attributed to naphtha ignition.

How Mr. William Farmer Looks at it.—Mr. William Farmer, who needs no introduction to our readers, very seldom appears in the role of a talker; but there is hardly to be found a closer observer of the "signs of the times" than the self-same gentleman. A reporter attached to the New York *Daily Tribune* recently called upon Mr. F., the object of the visit being to obtain his opinion in relation to gas versus electricity. Mr. Farmer said:

"The introduction of the electric light has not injured the gas interest; rather it has led to an increased consumption of gas. It has certainly created a demand for more light, and people whose eyes have been dazzled by the glare of the electric light use gas more freely and extravagantly than they ever did before. There was never more gas consumed in New York city than now, and the same may be said of all the other large cities in the country. This, in a measure, may be ascribed to the increasing demand for

gas as a source of heat as well as light. You can cook better with gas than with coal, and with less trouble and discomfort. Then the gas engine is being introduced extensively. Manufacturers are months behind in their orders, and are running to their full capacity to supply the demand. People do not appreciate how much light can be got out of gas. Electric discoveries have stimulated inventors in gas burners, and there is now in operation at the Manhattan Gas Company's office a Siemens burner that gives a light equal to 1,000 candles, besides other specimens which are of 500 candle power. I see no reason why the illuminating power of gas may not be indefinitely increased. These burners have been but recently introduced, and the demand for them is so great that much difficulty is experienced in obtaining them. By their use gas is cheaper than electricity of the same illuminating power. The electric light has not had things all its own way by any means. It has been repeatedly beaten by gas, both on the Continent and in England, mainly on account of its expensiveness; and many electric lighting schemes have collapsed there."

Coal Receipts at San Francisco, Cal.—The *Scientific Press* gives some interesting figures relative to the coal receipts at the port of San Francisco, Cal. The following table shows the figures for the past 24 years, including all sources of supply:

Year.	Tons.	Year.	Tons.
1860	77,635	1872	434,462
1861	116,245	1873	454,587
1862	120,545	1874	531,949
1863	135,550	1875	538,208
1864	167,298	1876	648,380
1865	150,141	1877	576,763
1866	192,605	1878	626,733
1867	248,925	1879	618,519
1868	282,023	1880	654,118
1869	328,973	1881	899,680
1870	320,494	1882	882,896
1871	315,197	1883	899,301

Some of the Pacific coast coal mines are shown to have increased their output within the past few years, while others have decreased their yields. For instance, the Mount Diablo mines, in 1882, yielded 113,255 tons, while in 1883 the output was but 76,192 tons. On the other hand, the Carbon Hill mines produced 64,745 tons in 1882, while in 1883 the yield had increased to 140,135 tons. From Seattle were received 150,000 tons in 1882, falling off to 139,600 tons in 1883. Coal is no longer shipped to San Francisco from Bellingham Bay, formerly a considerable factor in the market. The foreign coal comes mainly from Columbia, Great Britain, and Australia. British Columbia sent 157,762 tons in 1882, and 128,503 tons in 1883. The receipts from Australia were 158,901 tons in 1882, and 174,143 tons in 1883. The English-Welsh coal figured up to 131,355 tons in 1883, Scotch receipts being set down at 21,942 tons. Of Cumberland and anthracite (Eastern) coal there were received 39,856 tons in 1882, and 43,861 tons in 1883. From Renton, Coos Bay, and South Prairie the receipts were 43,600 tons. The prices of bituminous coals in the market of San Francisco are governed considerably by the amount of foreign business transacted in the shipment of wheat. When the season's wheat harvest has been good, coupled with an active foreign demand for the cereal product of California's fertile valleys, the price of coal rules easy, the foreign (more particularly the English) sailing masters finding it profitable to load with ballast in the shape of coal. This prime sort of ballast finds a ready market, the price, of course, varying with the number of such cargoes in port or "to arrive."

A Stray Fact from Portland, Maine.—The city of Portland, Maine, owns about 33 per cent. of the capital stock of the Portland Gas Light Company. The lowest price there charged for an excellent quality of illuminating gas is $1.85 per 1,000 cubic feet, a reduction (we think) of about 15 cents per 1,000 having gone into effect some one or two years ago. The annual report for the year shows that the gas consumption has been increased something over 10 per cent. during the past year.

He was not Killed.—An inmate of Cable's Hotel, No. 141 Fulton street, New York city, was found unconscious in his sleeping apartment, on June 8. The gas was turned on. Owing to the timely discovery of his condition, and the rendering of prompt medical assistance, the sufferer was rescued from death by asphyxiation.

Terre Haute, Ind., not Likely to Have Electric Light.—The indications are that the corporation formed for the purpose of supplying electric light to Terre Haute, Ind., will not "act in haste to repent at leisure" as has been the sorrowful experience of some of their less cautious brethren. It is asserted that many of the stockholders are of the opinion that "electric lighting will not prove a profitable investment for some time to come." These apprehensions would seem to be founded on business principles; and how far more plethoric many a wallet would be now if a similar policy had actuated investors during the height of the arc light craze.

No Money in Supplying Steam Heat from a Common Center.—The New Haven Heat Supply Company shut off steam from its pipes on the fifth of last May. A large stockholder in the concern said that the loss to the company during the past season had been $5,700, and stated the business had always been operated without profit. He further said that the proprietors were willing to sell the rights, plant, etc., for the sum of $25,000—the original cost of same having been $75,000. The business of supplying steam heat from a central station was proclaimed, at the outset of the scheme, to be one of the grandest schemes of the age. It is rather pitiful now, from the numerous wrecks announced, to contrast these glowing promises with the actual results accomplished. Among the defunct steam heating corporations may be mentioned those of Troy, N. Y.; Detroit, Mich.; Milwaukee, Wis.; Burlington, Iowa; Hartford, Conn.; Lynn, Mass., and one in New York city. *Per contra* to this it should be said that the surviving company at present operating in this city, claims to have been perfectly successful—even going so far as to say that interest on the plant is easily earned. Perhaps.

Pleased with the Light.—When the committee, having charge of the May festival, annually held at Pittsburgh, Pa., decided upon selecting the Fifth avenue market house as the most appropriate building wherein to hold the final festivities, the members were somewhat perplexed as how best to illuminate and properly ventilate the immense auditorium. It was at first thought that the arc light would be the most effective means of accomplishing the desired end; but, when the subject was thoroughly discussed, this proposition was abandoned. The ever alert and watchful Pittsburgh gas men urged upon the committee the merits of the high power Siemens burners, showing that both the conditions sought for (ample lighting and thorough ventilation) could be obtained by their aid. The suggestion was adopted, and the result was an entire success in every respect. The rich, clear rays flooded every part of the auditorium, the light being soft and pleasant to the eyes, and as steady and diffused as the best illumination ever produced from placing an argand burner on an oil lamp. The aid given to ventilation was almost incredible, and the pureness of the atmosphere, notwithstanding the crowded condition of the hall, was made matter for frequent comment among those in attendance.

Death of Dr. Angus Smith.—The death is announced (as occurring at Colwyn Bay, England, on the 12th of last May) of Dr. Angus Smith, Government Inspector of Alkali Works for the United Kingdom. He was the inventor of a preservative composition for coating cast iron pipes, and the preparation is largely used on gas mains laid in the British Islands. Dr. Smith was a prolific writer. His official position often brought him in contact with English gas engineers.

Columbus (Ohio) Gas Does Not Kill.—Mr. M. C. Deffenbaugh, a "heavy-weight" resident of Laurel Hill, Virginia, had business in the city of Columbus, Ohio, a few days ago. He registered at the Exchange Hotel, was assigned to a sleeping apartment, and retired to bed at an early hour. Next morning the hotel clerk, while passing through the hall, smelled an odor of escaping gas. Investigation being made, it was found that the Virginia "heavy-weight," on retiring for the night, had blown out the light, sleeping soundly notwithstanding that the gas was turned on full head. Deffenbaugh did not even complain of a headache. Columbus gas contains about 7 per cent. of carbonic oxide.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Working on Similar Lines.

Adrian, Mich., June 6, 1884.

To the Editor American Gas Light Journal:

In the issue of *London Journal of Gas Lighting*, date of May 20th, I noticed an (illustrated) article describing a "Dip Reducer," designed by Mr. John Somerville. I find this device to be almost an exact reproduction of an arrangement that I have had in use for the past year and a half, the object sought being the removal of tar from hydraulic main. Perhaps Mr. Somerville was ahead of me in the employment of this apparatus; if not, then I would like to get credit for the invention.

I must say that the plan works to perfection. It was my purpose to have brought the device to the attention of the Western Gas Association at the late St. Louis meeting; but, unfortunately, I was unable to so arrange my affairs as to be in attendance at the sessions.

It occurs to me that Mr. John Somerville and myself are working very closely upon similar lines, as that gentleman is, I believe, the inventor of one of the best coke-crushers at present in use in Europe. I would like to have him inspect a machine for accomplishing the same purpose, devised by me about six years ago. With this crusher I can break and screen 600 bushels of coke per hour, very little waste being entailed, and a two-horse engine furnishes all the power necessary to actuate it.

Yours truly, C. H. Raynor.

THE AMERICAN GAS LIGHT JOURNAL

Monday, June 16, 1884.

The Pelouze and Audouin Condenser.

Office Chicago Gas Lt. and Coke Co.,
Chicago, Ill., April 11th, 1884.

Jas. R. Smedberg, Esq.:

My Dear Sir—The Pelouze and Audouin Condenser which you furnished for our South Station has now been in continuous operation for two months.

It has been used to its full capacity of 1,500,000 cubic feet per day, and has removed all the tar from the gas which has passed through it. Indeed, the machine has done its work so perfectly that we can find no tar in the drips of the multitubular condenser which follows the P. and A. condenser.

We are now getting ready to place the second machine in position at the same station.

Yours truly,

—*Adv.* Theobald Forstall, V. P.

The Market for Gas Securities.

The temporary depression chronicled in our last issue, in regard to city gas shares more especially, has been entirely dissipated, and strength once more is the ruling feature. It is rather satisfactory to state that notwithstanding the rapid "slump" in market quotations, holders were not frightened into parting with their shares. This, of course, applies to the owners of small lots, for the hard-headed, close-figuring investors with large blocks registered to their credit have never given any sign of fear. Such a course is not a very surprising evidence of financial perspicacity, for men with extra large investments in gas shares are quite likely to keep close run of what the companies are doing. Manhattan is quoted at 280 bid, as against 265 on June 2; Metropolitan 230, as against 220; and Municipal 205 instead of 201.

Brooklyn shares, as a rule, closely sympathize with those of the Metropolis; and the figures there are all higher, stocks being strongly held at figures quoted.

In out-of-town shares we note that Jersy City gas is higher, notwithstanding the action taken by the Board of Aldermen in passing the ordinance giving the Consumers Company right to lay pipes, etc., over the Mayor's veto. Louisville (Ky.) gas makes its first appearance on our list. The capital stock of this company is one and one-half millions, par 50, and its market value is 122 bid, offered at 130. The security is a 10 per cent. one, and is "gilt edged." The following are the quations for general list.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. Scott & co.,)

34 Pine Street, New York City.

June 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	60	70
Equitable	2,000,000	100	90	92
Harlem	1,800,000	50	115	120
" Bonds	170,000		—	—
Manhattan	4,000,000	50	280	285
Metropolitan	2,500,000	100	230	—
" Bonds	658,000	—	107	110
Mutual	3,500,000	100	128	131
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	205	210
" Bonds	750,000		107	110
New York	4,000,000	100	152	154
Northern	125,000	50	—	80
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	130	133
Citizens	1,200,000	20	90	92
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	1,500,000	100	135	140
" Bonds	300,000		104	108
Peoples	1,000,000	10	80	82
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	90	92
Nassau	1,000,000	25	103	105
" Ctfs	700,000	1000	85	90
Williamsburgh	1,000,000	50	120	125
" Bonds	1,000,000	—	104	108
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	101	104
" " Bonds	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			51	51¼
" Bonds			113½	114
Central, S. F., Cal.			55	58
Capital, Sacramento, Cal.			57	59
Hartford, Conn	750,000	25	128	135
Jersey City	750,000	20	160	170
Laclede, St. Louis, Mo.	1,600,000	100	98	—
Louisville, Ky	1,500,000	50	122	130
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	164	168
Oakland, Cal			29	30
Peoples, Jersey City		—	75	80
" " Bonds			—	—
Paterson, N. J		25	96	99
Rochester, N. Y		50	70	80
Washington, D. C	2,000,000	20	190	200
Wilmington, Del		50	174	—
Yonkers		50	33	35
St. Louis, Missouri	600,000	50	255	256
San Francisco Gas Co. San Francisco, Cal.			50	51

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